

UNITED STATES DISTRICT COURT
FOR THE SOUTHER DISTRICT OF MISSISSIPPI
NORTHERN DIVISION

CREST AUDIO, INC.

Plaintiff,

v.

QSC AUDIO PRODUCTS, LLC

Defendant

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Civil Action No. 3:12-cv-755 CWR FKB

SPECIAL MASTER'S REPORT AND RECOMMENDATION ON CLAIM
CONSTRUCTION

**SPECIAL MASTER’S REPORT AND RECOMMENDATION ON CLAIM
CONSTRUCTION**

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SPECIAL MASTER'S REPORT AND RECOMMENDATION ON CLAIM CONSTRUCTION

I. Introduction

A. Background

Crest Audio, Inc. (“Crest”) filed its initial complaint in Civil Action No. 3:12-cv-755-CWR-FKB on November 7, 2012 (“*Crest I*”), alleging that QSC Audio Products, LLC (“QSC”) was infringing two patents – U.S. Patent No. 5,652,452 (the ’452 patent) entitled “Digital Signal Processor for Amplifier,” and U.S. Patent No. 6,023,153 (the ’153 patent) entitled “Audio Amplifier Having Power Factor Correction.” On September 27, 2013, Crest filed its initial complaint in Civil Action No. 3:13-cv-610-CWR-FKB (“*Crest II*”), alleging that QSC was infringing U.S. Patent No. 5,652,544 (the ’544 patent) entitled “Apparatus and Method for Programming an Amplifier.”

QSC petitioned the U.S. Patent and Trademark Office (PTO) for *inter partes* review (IPR) of claims 1-13 (all claims) of the ’542 patent under 35 U.S.C. §§ 311-319. The PTO Patent Trial and Appeal Board (PTAB) granted the petition on May 2, 2014, IPR2014-00129, as to claims 5 and 13, for alleged obviousness under 35 U.S.C. § 103, in view of four references. On April 29, 2015, the PTAB issued its final written decision concluding that QSC had not demonstrated by a preponderance of the evidence that either claim 5 or claim 13 was unpatentable. [Dkt. No. 152-1]

QSC also petitioned the PTO for *inter partes* review of claims 1-22 (all claims) of the ’153 patent. On May 2, 2014, the PTAB granted the petition, IPR2014-00127, on all claims for alleged obviousness based on “Admitted Prior Art” or APA (which included Figs. 1 and 2 of the ’153 patent, and accompanying disclosure, and other patents incorporated by reference into the ’153 patent), in view of two additional references. On April 29, 2015, the PTAB issued its final written decision concluding that QSC had demonstrated by a preponderance of the evidence that claims 1-22 were unpatentable. [Dkt. No. 152-3]

QSC further petitioned for *inter partes* review claims 1-15, 18-21, and 23-26 of the ’544 patent. On May 6, 2014, the PTAB granted the petition, Case IPR2014-00131, on those same claims, for alleged obviousness over several references, including what the PTAB dubbed “Admitted Prior Art” or APA (namely the ’544 patent description at col. 5, lines 46-55). On May 1, 2015, the PTAB issued its final written decision concluding that QSC had demonstrated by a preponderance of the evidence

that claims 1-15, 18, 19, 21 and 24-26 were unpatentable, but that claims 20 and 23 had not been shown to be unpatentable. [Dkt. No. 152-4]

While those IPRs were pending, QSC moved to stay both the '755 and '610 actions pending completion of those IPRs. Crest opposed the stay in the '755 case. On June 5, 2014, the Court granted the requested stay in both actions. *Crest I* [Dkt. No. 147], *Crest II* [Dkt. No. 69, text only order]

Following the PTAB's final written decisions in those IPRs, the parties moved to lift the stays. Additionally, QSC moved to consolidate the '755 and '610 actions. By Order dated March 4, 2016, the Court lifted the stay and consolidated the cases. [Dkt. 159]

The two remaining patents-in-suit are the '542 and '544 patents.

B. Referral to the Special Master

By an Order dated September 23, 2016 [Dkt. 186], the Court appointed the undersigned to serve as special master for claim construction. That Order also provided that the master "shall convene a conference with the parties by October 21, 2016, to determine a claim-construction briefing schedule and claim-construction hearing date." The parties and master, through email exchanges, agreed on a Stipulated Schedule for Claim Construction Briefing & Hearing Date [Report and Recommendation, Dkt. 190] which, *inter alia*, scheduled a one-day claim construction hearing for December 9, 2016. That schedule was adopted by the Court in a text-only Order entered on November 10, 2016, changing the location of the hearing to the Visiting Judge's Courtroom, Courtroom 6B, Jackson Federal Courthouse).

Accordingly, a claim construction hearing was held on December 9, 2016. This is the Special Master's Report and Recommendation on Claim Construction pursuant to the foregoing Order.

C. Overview

In light of the various disputes between the parties, the following is intended simply as a general overview of the patents-in-suit. Nothing herein should be construed as adopting, either expressly, or by implication, one or the other party's claim construction proposals. – or as excluding one or the other party's claim construction proposals.

The patents-in-suit are generally drawn to audio amplifiers that employ a digital signal processor. The abstract of the '542 patent, entitled, "Digital Signal Processor For Amplifier," explains:

An amplifier has a digital signal processor for receiving input digital or analog audio signals for modification by at least one of a plurality of signal processing functions and corresponding signal processing function parameters. The digital signal processor receives input control signals for changing the signal processing function and signal processing function parameters. The amplifier also includes a detecting device for directly monitoring performance of the amplifier and a detecting device for monitoring a current and voltage of a signal output from the amplifier. The digital signal processor monitors the detected amplifier performance, current and voltage and automatically controls the signal processing functions and parameters, as well as amplifier circuits, to make any necessary modifications to the signal output from the amplifier.

As illustrated in Fig. 2 of the '542 patent:

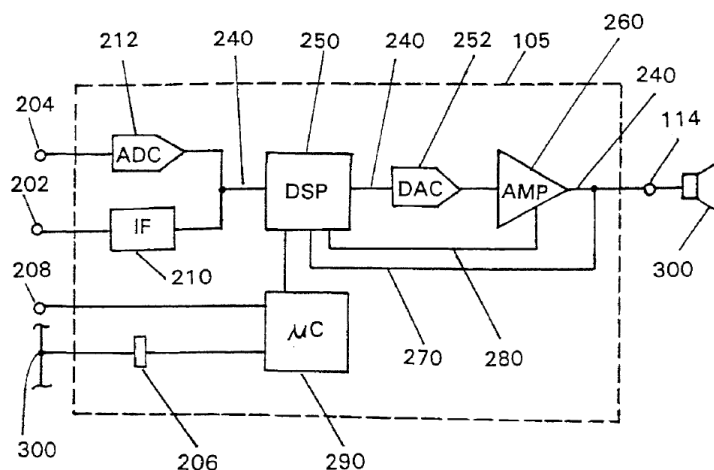


FIG. 2

an amplifier input port 202 may be connected to an analog signal input port such as a musical instrument, etc. for receiving analog audio signals. An amplifier input port 204 can be connected to a digital input device such as a sound mixing board, etc. for receiving input digital audio signals. Output port 114 is connected to a load such as a loudspeaker 300.

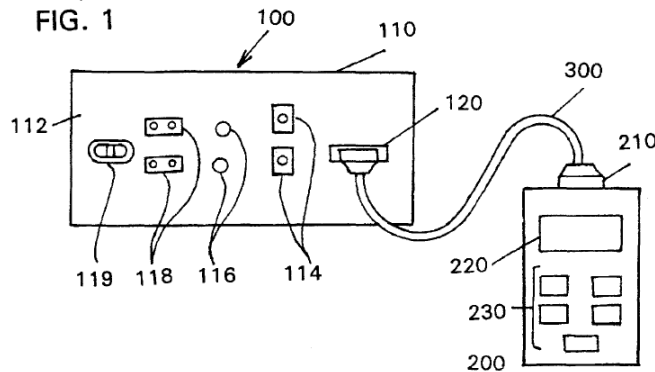
A digital signal processor module 200 includes a digital signal processor 250 connected in the amplifier main signal path 240. A controller "preferably" in the form of a microprocessor 290 performs a control function for downloading signal processing control and program signals input via the input port 206 from the network bus 300 and a portable programmer input through the programmer port 208. Those control signals define a program and program data that sets the signal

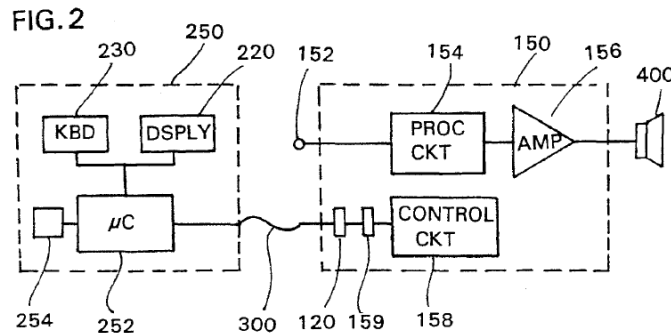
processing functions and function parameters. The microprocessor 290 gathers control signals and/or signal processing programs to be loaded into the digital signal processor 250. The microprocessor 290 may also be programmed to compute parameters for the digital signal processor 250 based on commands input from the programmer or network.

The abstract of the '544 patent, entitled "Apparatus and Method For Programming an Amplifier," explains:

An apparatus and method for programming an amplifier includes an amplifier and a portable programmer that is removably connectable to the amplifier. The portable programmer includes a microprocessor, a keypad, and a display screen. The amplifier includes a programming input port, a signal processing circuit, a power amplifier and a control circuit. When the portable programmer is connected to the amplifier, information relating to parameter of various signal processing circuit elements can be read and modified through the programmer. The information input via the keypad and displayed on the display screen is transmitted from the programmer via the microprocessor to the signal processing control circuit to change signal processing functions and/or signal process function parameters of at least one of the signal processing circuit elements. As a result, processing of a signal transmitted through the amplifier is changed so that a sound produced by the signal can be modified. The signal processing circuit elements remain programmed when the programmer is removed and/or power is disconnected.

As illustrated in Figs. 1 and 2:





an amplifier 100 includes a control panel 112 having input ports 114 and a plurality of control knobs 116 for controlling gain, volume, an equalizer circuit, a level threshold, etc.

The control panel 112 also includes a programming port 120 for receiving a connector from a portable amplifier programmer. A portable amplifier programmer 200 is removably connected to amplifier 100 through a connector 300. Programmer 200 includes a display screen 220 for displaying parameter values, desired signal modifications and other information. Portable programmer 200 also includes an input device such as keypad 230 for entering parameter and signal modification information, signal processing function programs and program data.

Portable programmer 200 allows a user to modify parameters of amplifier circuit elements inside the amplifier, modify signal processing functions set by the signal processing circuit, read back previously set parameter values and store a group of input parameter values for future use.

Other aspects of the patents-in-suit will be discussed further below.

D. The Parties' Submissions

The parties have filed or provided the following current submissions setting out their respective proposed constructions and arguments (along with various exhibits to their briefs not separately listed here):

Date Filed	Dkt. No.	Submission
8/19/2016	184	Amended Joint Claim Construction and Prehearing Statement ("AJCCS")
10/19/2016	191	Plaintiff Crest Audio, Inc.'s Opening Brief on Claim Construction For U.S. Patent No. 5,652,542 and 5,652,544 ("Crest's Op. Brief")
11/2/2016	192	QSC's Claim Construction Brief ("QSC's Resp. Brief")
11/9/2016	193	Plaintiff Crest Audio, Inc.'s Reply Brief on Claim Construction For U.S. Patent No. 5,652,542 and 5,652,544 ("Crest's Reply")

Date Filed	Dkt. No.	Submission
N/A	N/A	Third Declaration of William C. Pirkle (direct testimony at claim construction hearing) (“Pirkle 3 rd Decl.”)

II. Claim Construction Principles

A. Overview

A patent is a fully integrated written instrument. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 978 (Fed. Cir. 1995) (*en banc*), *aff’d*, 517 U.S. 370 (1996). A patent, by statute, must provide a written description of the invention, a disclosure that would enable one of ordinary skill in the art to make and use the invention, and a disclosure of the best mode known to the inventor for practicing the invention. *See* 35 U.S.C. § 112(a).¹ A patent must also contain claims “particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.” 35 U.S.C. § 112(b).² The claims of a patent provide the measure of a patentee’s right to exclude others from practicing the claimed invention. *See* 35 U.S.C. § 154.³

¹ 35 U.S.C. § 112(a) provides:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

² 35 U.S.C. § 112(b) provides:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

³ 35 U.S.C. § 154(a)(1) provides:

Every patent shall contain a short title of the invention and a grant to the patentee, his heirs or assigns, of the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States, and, if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States, or importing into the United States, products made by that process, referring to the specification for the particulars thereof.

B. The Claims

Primary claim construction principles are discussed and explained in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). Among those are that “[i]t is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’ ” *Id.* at 1312, quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004), and citing *Vitronics Corp. v. Conception, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). *See also Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998) (claim construction “begins and ends” with the actual words of the claims). “That principle has been recognized since at least 1836, when Congress first required that the specification include a portion in which the inventor ‘shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery.’ ” *Phillips*, 415 F.3d at 1312.

“[T]he words of a claim ‘are generally given their ordinary and customary meaning,’ ” and “the ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the patent application.” *Id.* at 1313. “That starting point is based on the well-settled understanding that inventors are typically persons skilled in the field of the invention and that patents are addressed to and intended to be read by others of skill in the pertinent art.” *Id.* at 1313. “Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.*

“In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.” *Id.* at 1314. Thus, in some instances, “general purpose dictionaries may be helpful,” but, as the court explained, “[i]n many cases that give rise to litigation * * * determining the ordinary and customary meaning of the claim requires examination of terms that have a particular meaning in a field of art.” *Id.* at 1314; *see Mangosoft, Inc. v. Oracle Corp.*, 525 F.3d 1327, 1333 (Fed. Cir. 2008) (“when considered in the context of and not divorced from the intrinsic evidence, there is nothing improper about referencing [a] definition in correctly construing the claim.”). “Because the meaning of a claim term as understood by persons of skill in the art is often not immediately apparent, and because patentees

frequently use terms idiosyncratically, the court looks to ‘those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean.’ ” *Id.*, quoting *Innova/Pure Water*, 381 F.3d at 1116. “ ‘Those sources include ‘the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.’ ” *Phillips*, 415 F.3d at 1314.

Thus, the claim construction process begins with the language used in the claims because “[q]uite apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular claim terms.” *Id.* “Other claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term. Because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims.” *Id.* (citation omitted).

“Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.” *Id.* That is referred to as “claim differentiation.” “For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.” *Id.* at 1314-15.

C. The Specification

The specification nevertheless remains important in claim construction. “The claims, of course, do not stand alone. Rather, they are part of ‘a fully integrated written instrument,’ consisting principally of a specification that concludes with the claims. For that reason, claims ‘must be read in view of the specification, of which they are a part.’ * * * [T]he specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’ ” *Id.* at 1315, quoting *Vitronics Corp. v. Conception, Inc.*, 90 F.3d at 1576, 1582.

In particular, “[c]onsistent with that general principle,” the cases recognize that (1) “the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor’s lexicography governs,” and (2) “[i]n other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor. In that instance as well, the inventor has dictated the correct claim scope, and the inventor’s intention, as expressed in the specification, is regarded as dispositive.” *Id.* at 1316.

However, two claim construction principles are: (1) claims are read in light of the specification, but (2) limitations from the specification must not be read into the claims. The line between the two is not always clear. See *Comark Communications, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186-87 (Fed. Cir. 1998) (“[T]here is sometimes a fine line between reading a claim in light of the specification, and reading a limitation into the claim from the specification.”). In *Phillips*, the Federal Circuit advised that the “line between construing terms and importing limitations can be discerned with reasonable certainty and predictability if the court’s focus remains on understanding how a person of ordinary skill in the art would understand the claim terms. For instance, although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments. In particular, we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment. That is not just because section 112 of the Patent Act requires that the claims themselves set forth the limits of the patent grant, but also because persons of ordinary skill in the art rarely would confine their definitions of terms to the exact representations depicted in the embodiments.” *Phillips*, 415 F.3d at 1323 (citations omitted).

The Federal Circuit also advised: “[t]o avoid importing limitations from the specification into the claims, it is important to keep in mind that the purposes of the specification are to teach and enable those of skill in the art to make and use the invention and to provide a best mode for doing so. One of the best ways to teach a person of ordinary skill in the art how to make and use the invention is to provide an example of how to practice the invention in a particular case. Much of the time, upon reading the specification in that context, it will become clear whether the patentee is setting out specific examples of the invention to accomplish those goals, or whether the patentee instead intends for the claims and the embodiments in the specification to be strictly coextensive. The manner in which the patentee uses a term within the specification and claims usually will make the distinction apparent.” *Id.* at 1323 (citations omitted).

Nevertheless, the Federal Circuit has acknowledged that, “[i]n the end, there will still remain some cases in which it will be hard to determine whether a person of skill in the art would understand the embodiments to define the outer limits of the claim term or merely to be exemplary in nature. While that task may present difficulties in some cases, we nonetheless believe that attempting to resolve that problem in the context of the particular patent is likely to capture the scope of the actual

invention more accurately than either strictly limiting the scope of the claims to the embodiments disclosed in the specification or divorcing the claim language from the specification.” *Id.* at 1323-24.

D. The Prosecution History

The words in the claim may also be interpreted in light of the prosecution history, if in evidence. *See Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1324 (Fed. Cir. 2002). “Like the specification, the prosecution history provides evidence of how the [United States Patent and Trademark Office (“PTO”)] and the inventor understood the patent. Furthermore, like the specification, the prosecution history was created by the patentee in attempting to explain and obtain the patent.” *Phillips*, 415 F.3d at 1317 (citations omitted).

“Yet because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes.” *Id.* “Nonetheless, the prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be.” *Id.*

III. Agreed Constructions

The parties have agreed to the following constructions:

Patent	Phrase	Agreed Construction
'542 patent, cls. 1, 5, and 13	“at least one of an algorithm which defines at least one signal processing function and signal processing function parameters”	Includes both an algorithm that defines a signal processing function and signal processing parameters. <i>See below</i> for “signal processing function.”
'544 patent, cl. 1	“at least one of an algorithm which defines at least one signal processing function and signal processing function parameters”	Crest says that the agreed construction is: “Includes both an algorithm that defines a signal processing function and signal processing parameters.” QSC says that the agreed construction is: “Includes both a signal processing function and a signal processing parameter.” <i>See below</i> for “signal processing function.”
AJCCS [Dkt. 184] at 1, Crest’s Op. Brief [Dkt. 191] at 6, QSC’s Resp. Brief [Dkt. 192] at 10.		

Accordingly, those agreed constructions are deemed stipulated by the parties, and require no further action by the master or the Court.

IV. Disputed Claim Terms

A. Level of Ordinary Skill in the Art

Claims are given the meaning a term would have to a person of ordinary skill in the art at the time of the invention. *Phillips*, 415 F.3d at 1313. Here, the parties have not disputed or relied on any particular level of ordinary skill in the art.

B. “An amplifier comprising”

The parties proposed the following contested constructions:

Claim Nos.	Crest’s Proposed Construction	QSC’s Proposed Construction
’542 patent, cls. 1, 5 and 13 ’544 patent, cl. 1	Does not limit the scope of any claim. Otherwise: “an audio system including electronic devices that amplify low-power audio signals to a level suitable for driving loudspeakers”	“A device for amplifying audio signals that includes a digital signal processor and a power amplifier in the same housing”
AJCCS [Dkt. 184] at 2-3 Crest’s Op. Brief [Dkt. 191] at 6, QSC’s Resp. Brief [Dkt. 192] at 11.		

Although QSC initially urged that “[a]n amplifier comprising,” appearing in the preambles of both the ’542 and ’544 patents, should be construed the same under the general rule that similar terms in related patents should be construed similarly, QSC in its response [Dkt. 192] now asserts that “[a]n amplifier comprising” should not be construed in the same manner. QSC’s Resp. Brief [Dkt. 192] at 19-21. In particular, QSC urges that the file histories of the ’542 and ’544 patents indicate that the same phrase should be receive different constructions, and because dependent claim 6 of the ’544 patent, provides: “the amplifier of claim 1, further comprising an amplifier housing, the signal processing circuit and power amplifier being located in said amplifier housing,” claim 1 of the ’544 patent should not be construed as requiring that the DSP be located in the same housing as the power amplifier. *Id.* at 21.

Accordingly, the following will address the disputed phrase in the context of the '542 patent. Insofar as understood, QSC no longer asserts that the preamble in claim 1 of the '544 patent should be deemed limiting, or that the phrase requires, in that patent, requires construction.

1. The Disputed Term in Context

Claim 1 of the '542 patent provides:

1. An amplifier comprising:

a power amplifier; and

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

2. Core Disputes

There are two core disputes: (1) whether the preamble is limiting, and (2) whether the term “amplifier” should be construed, as QSC proposes, as “include[ing] a digital signal processor and a power amplifier in the same housing.” (emphasis added)

3. Whether the Preamble is Limiting

a) Background

Whether and when claim preambles are limiting or not has been a recurring question since at least the 1930's. In one of the earliest cases considering whether a preamble (which the court characterized as an “introductory phrase”), *Braren v. Horner*, 47 F.2d 358 (CCPA 1931), the issue was whether “engraving machine” in the preamble or “introductory phrase” limited the claims. The court concluded that “there is nothing about the scope of the invention in issue which depends upon its use in connection with an engraving machine.” The court added, after reviewing prior cases, that “[t]hese cases, we are of opinion, are in point here and are sufficient authority, in view of the facts disclosed by this record, to justify the conclusion that the words, ‘in an engraving machine and the like,’ as used in the counts in issue here, are introductory only, and should not be considered as limitations of the subject matter of the issue. It is true * * * that in some cases courts have held that similar introductory

words should be considered as limitations. However, we think it may be safely said that in all such cases an examination of the facts disclosed by the record will show that the words thus considered as limitations, were an essential element in the novelty of the device and of the invention in issue there. No such contention is properly made here, as it is obvious that if there be invention, it is not in the construction of an engraving or similar machine, but in the drive by which such machine is operated.” 47 F.2d at 364 (emphasis added).

Thus, that court expressed the view that a preamble or “introductory phrase” was limiting only when the preamble added “an essential element in the novelty of the device and of the invention.” Although phrased differently in various cases over the ensuing 80+ years, that remains one of, albeit not necessarily the sole, underlying principles for when claim preambles are deemed limiting. For example, in *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945 (Fed. Cir. 2006), the Federal Circuit advised, *inter alia*, that “the preamble is regarded as limiting if it recites essential structure that is important to the invention or necessary to give meaning to the claim.” 441 F.3d at 952.

In the oft-cited case of *Kropa v. Robie*, 187 F.2d 150 (CCPA 1951), the U.S. Court of Customs and Patent Appeals⁴ attached an appendix listing (1) *ex parte* cases in which a preamble was held not to constitute a limitation in the claims, (2) *ex parte* cases in which the preamble either expressly or by necessary implication was considered to be a limitation upon the subject matter defined by the claim, (3) interference cases in which introductory clauses were held not to express a limitation in the counts, and (4) interference cases in which introductory clauses were expressly or impliedly held to express a limitation in the counts. That appendix also listed the primary rationale in those cases for holding whether a preamble was limiting or not. Often the rationales were contradictory or confusing.

⁴ In *South Corp. v. United States*, 690 F.2d 1368 (Fed. Cir. 1982), the Federal Circuit in 1982, as a newly created court from the U.S. Court of Customs and Patent Appeals and the U.S. Court of Claims, as one of its first “acts of business,” held that “[a]s a court of nationwide geographic jurisdiction, created and chartered with the hope and intent that stability and uniformity would be achieved in all fields of law within its substantive jurisdiction, we begin by adopting as a basic foundation the jurisprudence of the two national courts which served not only as our predecessors, but as outstanding contributors to the administration of justice for a combined total of 199 years, the Court of Claims and the Court of Customs and Patent Appeals.” *Id.* at 1371. Thus, decisions by the prior U.S. Court of Customs and Patent Appeals and the U.S. Court of Claims assumed the status as precedential decisions in the Federal Circuit.

In *Kropa*, the court sought to harmonize the rationales in the cases listed in the appendix as follows:

Of the thirty-seven cases of this court we have reviewed with respect to this problem it appears that the preamble has been denied the effect of a limitation where the claim or count was drawn to a structure and the portion of the claim following the preamble was a self-contained description of the structure not depending for completeness upon the introductory clause; or where the claim or count was drawn to a product and the introductory clause merely recited a property inherent in the old composition defined by the remaining part of the claim. In those cases, the claim or count apart from the introductory clause completely defined the subject matter, and the preamble merely stated a purpose or intended use of that subject matter. On the other hand, in those ex parte and interference cases where the preamble to the claim or count was expressly or by necessary implication given the effect of a limitation, the introductory phrase was deemed essential to point out the invention defined by the claim or count. In the latter class of cases, the preamble was considered necessary to give life, meaning, and vitality to the claims or counts. Usually, in those cases, there inhered in the article specified in the preamble a problem which transcended that before prior artisans and the solution of which was not conceived by or known to them. The nature of the problem characterized the elements comprising the article, and recited in the body of the claim or count following the introductory clause, so as to distinguish the claim or count over the prior art.

187 F.2d at 152 (emphasis added). The court concluded that the preamble of the apparatus claim at issue was necessary to give “give life and meaning to the counts.”

For a number of years, that, more or less, became the “standard” for deciding whether a preamble was limiting or not. However, as is evident from the context of the opinion, the “life and meaning” characterization referred to an analysis in which “the introductory phrase was deemed essential to point out the invention defined by the claim or count.” Thus, although *Kropa v. Robie* is frequently cited for the proposition that a preamble is limiting if necessary to give “to give life, meaning, and vitality to the claims or counts,” the holding was more than that – namely, the preamble language was “deemed essential to point out the invention defined by the claim or count.”

In *DeGeorge v. Bernier*, 768 F.2d 1318, 1322 n.3 (Fed. Cir. 1985), the Federal Circuit remarked: “Generally, and in this case, the preamble does not limit the claims.” However, in *Bicon*, the Federal Circuit wrote, *inter alia*, that “[w]hile it is true that preamble language is often treated as nonlimiting in nature, it is not unusual for this court to treat preamble language as limiting, as it is in this case.” 441 F.3d at 952. Thus, it cannot be fairly said that preambles are either “generally” limiting or not limiting. It depends on the facts of each case. Or, as the Federal Circuit explained in *Bicon*, “we have stated

that “whether to treat a preamble as a claim limitation is determined on the facts of each case in light of the claim as a whole and the invention described in the patent,” 441 F.3d at 952, quoting *Storage Tech. Corp. v. Cisco Sys., Inc.*, 329 F.3d 823, 831 (Fed.Cir.2003).

In *Bicon*, the Federal Circuit further explained: “If the body of the claim ‘sets out the complete invention,’ the preamble is not ordinarily treated as limiting the scope of the claim. * * * However, the preamble is regarded as limiting if it recites essential structure that is important to the invention or necessary to give meaning to the claim. * * * That is, if the claim drafter ‘chooses to use both the preamble and the body to define the subject matter of the claimed invention, the invention so defined, and not some other, is the one the patent protects.’ * * * Moreover, when the limitations in the body of the claim ‘rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention.’” 441 F.3d at 952.

In *Catalina Mktg. Int’l v. Coolsavings.com, Inc.*, 289 F.3d 801 (Fed. Cir. 2002), the Federal Circuit, while noting that “[n]o litmus test defines when a preamble limits claim scope,” offered several “guidelines.” Those guidelines included the following which indicate that the preamble might be limiting: (1) “dependence on a particular disputed preamble phrase for antecedent basis may limit claim scope because it indicates a reliance on both the preamble and claim body to define the claimed invention,” (2) “when the preamble is essential to understand limitations or terms in the claim body, the preamble limits claim scope,” (3) “when reciting additional structure or steps underscored as important by the specification, the preamble may operate as a claim limitation,” (4) “clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention.” 289 F.3d at 808-09.

Those guidelines also included the following in which the preamble might not be limiting: (1) “preamble language merely extolling benefits or features of the claimed invention does not limit the claim scope without clear reliance on those benefits or features as patentably significant,” (2) “preambles describing the use of an invention generally do not limit the claims because the patentability of apparatus or composition claims depends on the claimed structure, not on the use or purpose of that structure,” (3) “statements of intended use or asserted benefits in the preamble may, in rare instances, limit apparatus claims, but only if the applicant clearly and unmistakably relied on those uses or benefits to distinguish prior art.” *Id.* at 809.

More recently, in *Symantec Corp. v. Computer Associates International, Inc.*, 522 F.3d 1279 (Fed. Cir. 2008), the Federal Circuit reiterated that “[i]n general, a preamble is construed as a limitation ‘if it recites essential structure or steps, or if it is “necessary to give life, meaning, and vitality” to the claim.’” * * * A preamble is not limiting, however, “where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.” * * * In *Catalina*, we identified several guideposts to aid in determining whether a preamble should be given limiting weight. For example, ‘clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention.’ * * * Absent clear reliance on the preamble in the prosecution history, or in situations where it is necessary to provide antecedent basis for the body of the claim, the preamble ‘generally is not limiting.’ * * * Thus, in general, the purpose of a claim preamble is to give context for what is being described in the body of the claim; if it is reasonably susceptible to being construed to be merely duplicative of the limitations in the body of the claim (and was not clearly added to overcome a rejection), we do not construe it to be a separate limitation.” 822 F.3d at 1288-89.

b) Parties’ Arguments

(1) Crest’s Opening Brief

Crest urges that the preamble should not be construed as limiting because: (1) “The term ‘amplifier’ is only a generic ‘descriptive name’ given to the set of limitations that follow the preamble,” (2) “instead of ‘[a]n amplifier comprising,’ claims 1, 5, and 13 of the ‘542 patent could just as easily have begun with the preamble ‘a system comprising’ or ‘a device comprising’ with absolutely no difference in the meaning and significance of the limitations that are contained in the body of the claims of the ‘542 patent,” and (3) “at no time during the prosecution history did the patentee add the term “amplifier” to overcome any prior art reference.” Crest’s Op. Brief [Dkt. 191] at 7-8.

Crest urges that “amplifier” as used in the ‘544 patent should not be construed as limiting for similar reasons. *Id.* at 8. But Crest adds that QSC, in the Amended Joint Claim Construction Statement did not seem to require construction of “amplifier” in the ‘544 patent. *Id.* at 9.

(2) QSC’s Responsive Brief

QSC asserts that “[t]he ‘542 patent’s specification and file history require that the asserted claims of this patent be limited to amplifiers with a DSP in the same housing as the power amplifier.”

QSC's Resp. Brief [Dkt. 192] at 11. QSC urges, *inter alia*, that (1) the specification, under Background of the Invention, states: "The *present invention* relates to a digital signal processor *located within an amplifier...*," and that the Federal Circuit has so limited claims when the specification describes features as being of "the invention," (2) the specification differentiates between "amplifiers" with DSPs and "amplifier systems" that do not have integrated DSPs, (3) the specification describes only one embodiment, in which the DSP is located in the same housing as the power amplifier, (4) the prosecution history "compels" construing "amplifier" to include a housing limitation, and (5) the housing limitation "must be included *somewhere* in the '542 patent's claims, and the preamble—'an amplifier comprising'—is the most natural place for it." *Id.* at 11-22.

In essence, QSC urges that the claims of the '542 patent should be limited to require that the DSP and power amplifier be located "in the same housing"—and that construing "amplifier" in the claim preamble coupled with construing the preamble as limiting reaches that objective. In particular, QSC urges that "a preamble is limiting whenever it is necessary to properly define the invention," and "construing an 'amplifier comprising' in the '542 patent as 'a device for amplifying audio signals that includes a digital signal processor and a power amplifier in the same housing' is necessary to properly define the scope of the invention." *Id.* at 22-23.

c) Discussion

The question addressed here is whether the preamble, "an amplifier comprising," should be deemed to be limiting or not. The second question of whether "amplifier" should be construed as QSC urges will be addressed further below.

Once again, for ease of reference, claim 1 of the '542 patent calls for:

1. An amplifier comprising:

a power amplifier; and

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

It is plain from the words of the claim that the body of the claim is complete. The claim body calls for “a power amplifier” and “a digital signal processor” which are “connected.” The “digital signal processor” is further defined as “capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,” and as having “a first input for receiving at least one of the algorithm and signal processing function parameters,” and “an input/output port” having the functions of (1) “for receiving performance characteristics of the power amplifier” and (2) “for transmitting control signals for modifying the performance of the power amplifier.”

In terms of the “guidelines” outlined in *Coolsavings.com*, and the other foregoing cases, the preamble (1) does not provide antecedent basis for terms in the claim body, (2) does not indicate a reliance on both the preamble and claim body to define the claimed invention, and (3) is not essential to understand limitations or terms in the claim body.

As noted above, a claim preamble might also be limiting when “reciting additional structure or steps underscored as important by the specification, the preamble may operate as a claim limitation.” *Coolsavings.com, Inc.*, 289 F.3d at 809. Or, as expressed in *Braren*, the preamble may be limiting when terms of the preamble “were an essential element in the novelty of the device and of the invention in issue * * *.” 47 F.2d at 364. Or, as expressed in *Bicon*, “the preamble is regarded as limiting if it recites essential structure that is important to the invention or necessary to give meaning to the claim.” 441 F.3d at 952.

Here, QSC makes what is essentially a “boot strap” argument. Namely, QSC urges that “amplifier” should be construed as “[a] device for amplifying audio signals that includes a digital signal processor and a power amplifier in the same housing,” (emphasis added) And, based on that construction, the preamble should be deemed limiting because it adds a limitation (“in the same housing”) not found in the body of the claim.

If the preamble to claim 1 of the ’542 patent had actually called for “[a]n amplifier, including a digital signal processor and a power amplifier in the same housing, comprising,” then QSC may have had a point because the body of the claim does not expressly require that the “digital signal processor” and the “power amplifier” reside “in the same housing.”

But the actual preamble is simply “[a]n amplifier comprising.” As such, the actual preamble – or, more precisely the term “amplifier” – does not recite “additional structure or steps underscored as

important by the specification,” *Coolsavings.com, Inc.*, 289 F.3d at 809, or “an essential element in the novelty of the device and of the invention in issue * * *,” *Braren*, 47 F.2d at 364, or “essential structure that is important to the invention or necessary to give meaning to the claim.” *Bicon*, 441 F.3d at 952.

With respect to QSC’s arguments that “[t]he ’542 patent’s specification and file history require that the asserted claims of this patent be limited to amplifiers with a DSP in the same housing as the power amplifier,” QSC’s Resp. Brief [Dkt. 192] at 11, that (1) the specification, under Background of the Invention, states: “The *present invention* relates to a digital signal processor *located within an amplifier...*,” and that the Federal Circuit has so limited claims when the specification describes features as being of “the invention,” (2) the specification differentiates between “amplifiers” with DSPs and “amplifier systems” that do not have integrated DSPs, (3) the specification describes only one embodiment, in which the DSP is located in the same housing as the power amplifier, (4) the prosecution history “compels” construing “amplifier” to include a housing limitation, and (5) the housing limitation “must be included *somewhere* in the ’542 patent’s claims, and the preamble—‘an amplifier comprising’—is the most natural place for it,” *id.* at 11-22, those arguments are addressed more fully below in considering QSC’s proposed construction of “amplifier” as “[a] device for amplifying audio signals that includes a digital signal processor and a power amplifier in the same housing.”

Suffice it here to say that the Federal Circuit in *Coolsavings* and like cases was referring to the situation where the preamble itself recites “additional structure or steps” and the specification emphasized that such additional structure was important to the invention. Here, quite simply, unlike those cases, the subject preamble recites only an “amplifier.”

And, insofar as understood, QSC does not advocate that the preamble as written is limiting.

d) Recommendation

The master recommends that the Court conclude that the preambles in claims 1, 5 and 13 of the ’542 patent, as written, are not limiting. As noted above, it is understood that QSC no longer asserts that the preamble of claim 1 of the ’544 patent should be deemed as limiting.

4. Construction of “[a]n amplifier comprising”

As noted above, the “core dispute” is whether the phrase should be construed as “[a] device for amplifying audio signals that includes a digital signal processor and a power amplifier in the same housing” (emphasis added) as QSC proposes.

a) The Parties’ Arguments

(1) Crest’s Opening Brief

(a) Ordinary Meaning and ’542 Specification

Crest urges that “amplifier” should be given its “ordinary meaning” of “an audio system including electronic devices that amplify low-power audio signals to a level suitable for driving loudspeakers.” Crest’s Op. Brief [Dkt. 191] at 9. Crest urges that QSC’s proposed construction is inconsistent with the “ordinary meaning” of amplifier because “a housing has practically nothing to do with the electronic amplification of low-power audio signals to levels suitable to driving loudspeakers, which is precisely the technology to which the ’542 and ’544 patents are directed.” *Id.*

Namely, Crest argues, an “amplifier,” as normally understood, is not limited to a device having a DSP and a power amplifier “in the same housing” – or, Crest adds, “in the same box.” *Id.*

Crest, pointing to the ’544 patent, notes that claims 1 and 6 provide:

1. An amplifier comprising:

an input port for receiving an input signal;

a signal processing circuit comprising a digital signal processor capable of receiving at least one of a signal processing function and a signal processing function parameter, wherein the signal processing circuit receives the input signal from the input port and modifies the input signal;

a power amplifier for amplifying the modified input signal received from the signal processing circuit and outputting an amplified signal to an output device;

an external programmer; and

a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

6. The amplifier of claim 1, further comprising an amplifier housing, the signal processing circuit and power amplifier being located in said amplifier housing.

Crest, relying on the doctrine of claim differentiation, *i.e.*, “the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim,” *Phillips*, 415 F.3d at 1315, notes that dependent claim 6 adds that the amplifier of claim 1 of the ’544 patent further includes “an amplifier housing, the signal processing circuit and power amplifier being located in said amplifier housing.” Crest urges that QSC’s proposed construction would render dependent claim 6 of the ’544 patent “completely meaningless” and, under the doctrine of claim differentiation, should lead to the conclusion that claim 1 (at least of the ’544 patent) should not be construed as requiring the housing limitation of dependent claim 6.

As noted above, QSC no longer asserts that “[a]n amplifier comprising” in claim 1 of the ’544 patent should be construed the same as in claims 1, 5 and 13 of the ’542 patent. Namely, QSC no longer asserts that “[a]n amplifier comprising” in claim 1 of the ’544 patent should be construed as including the housing limitation of dependent claim 6. QSC now too agrees that, due to dependent claim 6, “the inventor did not believe that independent claim 1 of the ’544 patent required the DSP to be in the same housing as the power amplifier.” QSC’s Resp. Brief [Dkt. 192] at 21. However, QSC notes that a similar dependent claim does not appear in the ’542 patent, and other differences in the intrinsic records of the ’542 and ’544 patents, discussed further below, should lead to a conclusion that “[a]n amplifier comprising” should receive a different construction in the ’542 patent.

(b) Excluded Embodiment

Crest also urges that the specification of the ’542 patent “makes clear that an ‘amplifier’ can be ‘integral’ (i.e., having components in one housing) or interconnected (having components distributed in a network and not necessarily in a single housing).” Crest’s Op. Brief [Dkt. 191] at 11 (emphasis in original). Crest points to the specification describing Figs. 3 and 4 as “FIG. 3 is a schematic view of *a conventional amplifier* having an integral signal processing circuit and power amplifier; and FIG. 4 is a schematic view of *another conventional amplifier* having a dedicated function signal processing circuit.” *Id.* quoting ’542 patent, col. 4, lines 31-36 (emphasis added).

Crest contends that “[t]he ’542 patent explicitly distinguishes the amplifier in FIG. 4 from the one shown in FIG. 3 (see below) in stating the ‘power amplifier 16 and signal processing circuit 14 do not form an integral unit as in the amplifier 10 of FIG. 3 but instead *are separate units* that are interconnected.’ ” *Id.* quoting ’542 patent, col. 2, lines 2-5 (emphasis added).

“Consequently,” Crest argues, “the construction of the term ‘amplifier’ that is adopted by the Court should be consistent with the amplifiers depicted in both FIG. 3 and FIG. 4 of the ’542 patent (see below), which do not contain the limitations Defendant seeks to import.” *Id.*

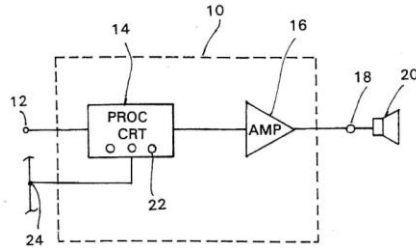


FIG. 3

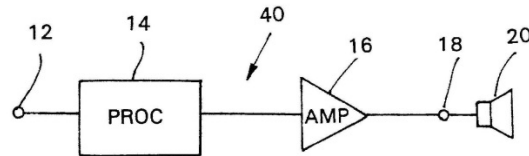


FIG. 4

According to Crest, “[t]he key similarity between the ‘integral’ amplifier embodiment in FIG. 3 and the ‘interconnected’ amplifier embodiment in FIG. 4 is that both amplifiers have a ‘signal path’ that has an origination (point 12 above) where a low-powered audio signal is input and a termination where an amplified audio signal is directed for driving a loudspeaker (20).” Crest’s Op. Brief [Dkt. 191] at 12. Crest urges that “[t]he ’542 patent makes clear that both the ‘integral’ and ‘interconnected’ amplifiers in FIGS. 3 & 4 constitute conventional amplifiers.” *Id.*

Citing *Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1276-77 (Fed. Cir. 2008) (“[w]e normally do not interpret claim terms in a way that excludes embodiments disclosed in the specification” unless “those embodiments are clearly disclaimed in the specification * * * or prosecution history.”), Crest urges that QSC’s proposed construction would cover the embodiment of Fig. 3, but not the embodiment of Fig. 4, and thus is “fatally flawed as a matter of law.” Crest’s Op. Brief [Dkt. 191] at 12.

(c) Networked or Interconnected

Crest further urges that the ’542 patent specification “confirms that an amplifier can comprise a networked or interconnected arrangement of components.” *Id.* Crest urges that the specification provides that a DSP module may include an input port such as a bus connected to a network of interconnected amplifiers for receiving control signals from the network. *Id.*

The portion of the specification that Crest refers to provides:

The module [DSP module] preferably may include another input port such as a bus connected to a network of interconnected amplifiers for receiving control signals from the network. The network is connected to a computer or other similar device which is used for entering control signals and transmitting the control signals over the network

to the various amplifiers of the network. The control signals define functions and/or function parameters for each of the plurality of amplifiers connected to the network.

'542 patent, col. 2, lines 51-59.

Crest concludes that "[t]herefore, it is clear that the '542 patent contemplates and discloses both an integral (single housing) amplifier and an amplifier that is interconnected (or networked) and thus has components residing in multiple separate housings." Crest's Op. Brief [Dkt. 191] at 13.

(2) QSC's Response

QSC urges that "[t]he '542 patent's specification and file history require that the asserted claims of this patent be limited to amplifiers with a DSP in the same housing as the power amplifier." QSC's Resp. Brief [Dkt. 192] at 11. QSC makes three arguments: (1) the specification describes "the invention" as a digital signal processor "located within an amplifier," (2) the specification differentiates between "amplifiers" with integrated DSPs and "amplifier systems that do not necessarily have integrated DSPs, and (3) Fig. 2 represents an embodiment of "the invention."

(a) "the invention"

With respect to the first argument, QSC notes that "the specification explicitly states that this [amplifiers with a DSP in the same housing as the power amplifier] *is* the invention. In the 'background of the invention' section, the inventor states: 'The *present invention* relates to a digital signal processor *located within an amplifier* * * *.'" QSC's Resp. Brief [Dkt. 192] at 11 (QSC's emphasis), quoting '542 patent, col. 1, lines 8-9.

What the specification at that juncture actually says is:

BACKGROUND OF THE INVENTION

The present invention relates to a digital signal processor located within an amplifier, and more particularly, to a digital signal processor provided in a signal path of an amplifier for programming both signal processing functions and associated signal processing function parameters according to signals input to the digital signal processor.

'542 patent, col. 1, lines 6-14.

QSC urges that "[t]he Federal Circuit has long recognized that when the specification describes the features of 'the invention,' the claims must be limited to those features. As the Federal Circuit put it in *Verizon Services Corp. v. Vonage Holdings Corp.*, '[w]hen a patent thus describes the features of the

“present invention” as a whole, this description limits the scope of the invention.’ ” QSC’s Resp. Brief [Dkt. 192] at 11.

(b) “amplifiers” v. “amplifier system”

With respect to the second argument, namely that the specification differentiates between “amplifiers” (which, according to QSC have integrated DSPs) and “amplifier system” (which do not necessarily have integrated DSPs), QSC notes that the “background of the art section [of the ’542 patent] provides, ‘[c]onventional amplifiers, such as the amplifier 10 shown in FIG.3, typically have ... a signal processing circuit 14, [and] a power amplifier 16 The signal processing circuit 14 and power amplifier 16 *form an integral unit* as seen in FIG. 3.’ ” QSC’s Resp. Brief [Dkt. 192] at 11-12 (emphasis by QSC), quoting ’542 patent, col. 1, lines 16-21.

The portion of the specification that QSC points to is describing the prior art as reflected in Fig. 3:

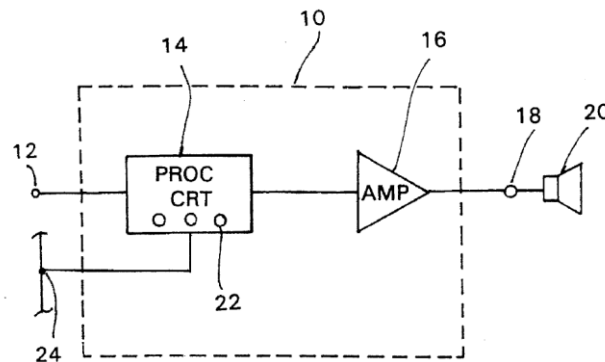


FIG. 3
PRIOR ART

The specification explains:

Conventional amplifiers, such as the amplifier 10 shown in FIG. 3, typically have a signal path including an input port 12, a signal processing circuit 14, a power amplifier 16 and an output port 18 connected to a load such as a loudspeaker 20. The signal processing circuit 14 and power amplifier 16 form an integral unit as seen in FIG. 3. The signal processing circuit 14 includes various analog and/or digital components such as resistors, capacitors, switches and other electronic devices that together define a signal processing function.

’542 patent, col. 1, lines 16-24.

QSC urges “[b]y contrast, in ‘a conventional amplifier *system* 40’ as shown in FIG. 4, ‘the power amplifier 16 and signal processing circuit *do not form an integral unit as in the amplifier 10 of FIG 3* but instead are separate units that are interconnected.’ ” QSC’s Resp. Brief [Dkt. 192] at 12 (emphasis by QSC), quoting ’542 patent, col. 1, line 66-col. 2, line 5.

This portion of the specification refers to Fig. 4:

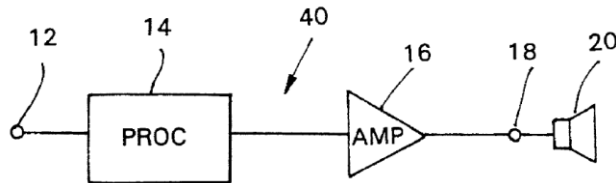


FIG. 4
PRIOR ART

The specification explains in context:

Another embodiment of a conventional amplifier system 40 is shown in FIG. 4 wherein like reference numerals indicate like elements to avoid repetition. In this type of amplifier system, the power amplifier 16 and signal processing circuit 14 do not form an integral unit as in the amplifier 10 of FIG. 3 but instead are separate units that are interconnected. The signal processing circuit 14 in this type of amplifier system 40 is a dedicated function unit that cannot be modified without removing and/or replacing the signal processing circuit elements. Thus, the signal processing function and associated parameters in this amplifier system cannot be changed.

’542 patent, col. 1, line 66-col. 2, line 10.

During the claim construction hearing, QSC illustrated the foregoing in the following presentation slides:

QSC's Slides During Claim Construction Hearing

BACKGROUND OF THE ART

Conventional amplifiers, such as the amplifier 10 shown in FIG. 3, typically have a signal path including an input port 12, a signal processing circuit 14, a power amplifier 16 and an output port 18 connected to a load such as a loudspeaker 20. The signal processing circuit 14 and power amplifier 16 form an integral unit as seen in FIG. 3. The signal processing circuit 14 includes various analog and/or such as resistors, capacitors, switches a

'542 patent at 11:8-13

**FIG. 3
PRIOR ART**

Another embodiment of a conventional amplifier system 40 is shown in FIG. 4 wherein like reference numerals indicate like elements to avoid repetition. In this type of amplifier system, the power amplifier 16 and signal processing circuit 14 do not form an integral unit as in the amplifier 10 of FIG. 3 but instead are separate units that are interconnected. The signal processing circuit 14 in this type of amplifier system 40 is a dedicated function unit that cannot be modified without removing and/or replacing the signal

'542 patent at 11:16-21:10

**FIG. 4
PRIOR ART**

Amplifier

Amplifier System

**FIG. 3
PRIOR ART**

**FIG. 4
PRIOR ART**

Amplifier

Amplifier System

Although it is possible to change the signal processing function and associated parameters of the amplifier system 40 and amplifier 10 by removing and modifying the signal processing circuit, this requires a great deal of time and effort and additional signal processing components. Also, the modification, removal and/or replacement of the various signal processing circuit elements is time consuming and difficult because the signal processing circuit elements are typically plug-in or solderable components.

'542 patent at 11:19

SUMMARY OF THE INVENTION

There exists a need for an improved amplifier signal processing circuit capable of modifying both signal processing functions and signal processing function parameters.

'542 patent at 11:24

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a schematic view of an amplifier according to a preferred embodiment of the present invention;

FIG. 2 is a schematic view of a digital signal processing circuit for the amplifier of FIG. 1;

FIG. 3 is a schematic view of a conventional amplifier having an integral signal processing circuit and power amplifier; and

FIG. 4 is a schematic view of another conventional amplifier having a dedicated function signal processing circuit.

'542 patent at 12:35

Amplifier

Amplifier System

QSC urges that the claims of the '542 patent rely on that distinction. Namely, QSC urges that when claim 1 refers an "amplifier comprising," rather than an "amplifier system comprising," the

intent was to refer to “amplifiers” with a DSP in the same housing as the power amplifier. QSC’s Resp. Brief [Dkt. 192] at 12.

QSC also notes that the title of the ’542 patent is “Digital Signal Processor for Amplifier,” not “Digital Signal Processor for Amplifier *System*,” and the abstract states “[a]n amplifier has a digital signal processor.... *The amplifier* also includes a detecting device....” *Id.* (emphasis by QSC).

QSC further notes that “the specification discloses that the location of the DSP within the amplifier provides benefits over the prior art: ‘[t]he location of the digital signal processor *in* the amplifier allows for the implementation of distributed system performance such as array steering and acoustic zone control.’ ” *Id.* (emphasis by QSC), quoting ’542 patent, col. 4, lines 15-18.

What the specification says at that juncture in context is:

In addition, the digital signal processor of the preferred embodiment can monitor load performance for a plurality of amplifiers to perform diagnostic functions. Also, the location of the digital signal processor in the amplifier allows for the implementation of distributed system performance such as array steering and acoustic zone control. Further, adaptive algorithms and linear-phase all-zero filters can be implemented.

’542 patent, col. 4, lines 13-21.

(c) “one embodiment”

QSC urges that the specification only discloses one embodiment – an embodiment in which the DSP is located in the same housing as the power amplifier. QSC’s Resp. Brief [Dkt. 192] at 12.

Referring to Fig. 1:

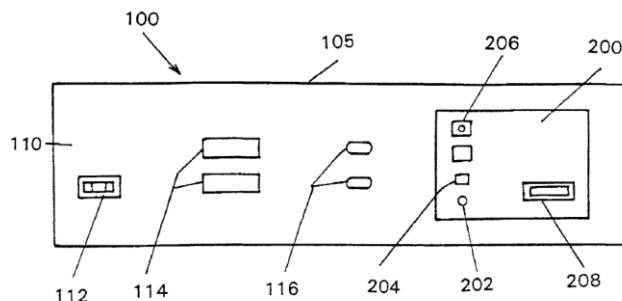


FIG. 1

QSC says that the “specification describes the preferred embodiment as “amplifier 100 ... includes an amplifier housing 105. The amplifier housing 105 contains an amplifier control panel 110.... The

control panel 110 also includes a digital signal processor module 200.’ ” QSC’s Resp. Brief [Dkt. 192] at 12-13, quoting ’542 patent, col. 4, lines 41-48.

What the specification says at that juncture, in context, is:

An amplifier 100 according to a preferred embodiment of the present invention is shown in FIG. 1 and includes an amplifier housing 105. The amplifier housing 105 contains an amplifier control panel 110 which has an AC power connector 112, a plurality of output ports 114 and a plurality of conventional control knobs 116 for controlling volume and gain, for example. The control panel 110 also includes a digital signal processor module 200.

The digital signal processor module 200 includes a plurality of input ports including a digital signal input port 202 and an analog signal input port 204 for receiving input audio signals. A network bus input port 206 is also provided on the module 200 for receiving input digital audio signals and/or input digital control signals from a network of interconnected amplifiers. Also, a portable programmer input port 208 is provided on the module 200 for being removably connected to and receiving digital control signals from a portable programmer described in U.S. patent application Ser. No. 08/558,344 referred to above.

’542 patent, col. 4, lines 41-59.

Referring to Fig. 2:

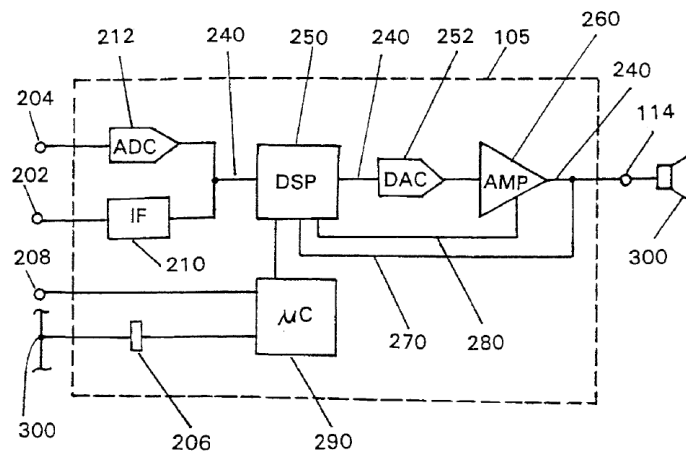


FIG. 2

QSC urges that the “signal processor module 200, for its part, ‘includes a digital signal processor 250 connected in the amplifier main signal path 240 shown in FIG. 2.’ ” As shown in Figure 2, the power

amplifier and the DSP are contained within the same housing, shown as the dotted line 105.” QSC’s Resp. Brief [Dkt. 192] at 13.

QSC also suggests that “Crest will undoubtedly—and erroneously—claim that Figure 2 merely represents the preferred embodiment, and the claims should not be limited to that embodiment.” *Id.* QSC urges: “But Crest is wrong about the law. The Federal Circuit has repeatedly recognized that where the preferred embodiment *is* the invention—as is the case here—the claims *must* be so limited. For instance, in *Chimie v. PPG Indus. Inc.*, the Federal Circuit held that ‘when the preferred embodiment is described in the specification as the invention itself, the claims are not necessarily entitled to a scope broader than that embodiment.’ [402 F.3d 1371, 1379 (Fed. Cir. 2005)] The Figure 2 embodiment *is* the invention, and the claims are not entitled to a scope broader than this embodiment.” QSC’s Resp. Brief [Dkt. 192] at 13.

(d) Housing Limitation Could Occur in Other Locations as Well

QSC urges that “[t]he law unambiguously requires that claims be construed consistent with the scope of the invention as described in the specification and the prosecution history, and, therefore, that the asserted claims of the ’542 patent must be construed to include the housing limitation.” QSC’s Resp. Brief [Dkt. 192] at 21-22, citing *Eon Corp. IP Holdings v. Silver Spring Networks*, 815 F.3d 1314, 1320 (Fed. Cir. 2016), for the proposition that “[a] party is ... ‘not entitled to a claim construction divorced from the context of the written description and prosecution history.’”

QSC contends that “[t]he housing limitation, therefore, must be included *somewhere* in the ’542 patent’s claims, and the preamble—‘an amplifier comprising’—is the most natural place for it.” QSC’s Resp. Brief [Dkt. 192] at 22. While QSC acknowledges “the general rule is that a preamble is not limiting,” QSC urges that general rule does not apply here. QSC urges that a preamble is limiting whenever the preamble is necessary to properly define the invention, and contends that “construing an ‘amplifier comprising’ in the ’542 patent as ‘a device for amplifying audio signals that includes a digital signal processor and a power amplifier in the same housing’ is necessary to properly define the scope of the invention.” *Id.* at 23.

QSC argues that “if the Court believes that the preamble cannot be limiting, the housing limitation must be *still* be implemented somewhere in the claims. As an alternative to including the housing limitation in the preamble, the Court could include the housing limitation after the limitation ‘digital signal processor being connected to the power amplifier.’ ” QSC’s Resp. Brief [Dkt. 192] at

23. QSC argues “[t]hat is, after all, where the housing limitation was supposed to be and where the inventor represented it was.” *Id.*, inferentially referring to how the claims of the ’542 patent were amended during prosecution, as discussed further below.

QSC contends that “[u]ltimately, regardless of *where* the housing limitation fits, the basic point remains unchanged: The scope of the invention as represented by the inventor in the specification and file history is unambiguously limited to an amplifier with a DSP and power amplifier in the same housing. The claims must be so limited too.” *Id.*

(e) Response to Crest’s Arguments

(i) Brief Description of the Drawings

In response to Crest’s reference to the “brief description of the drawings” section of the ’542 patent providing: “FIG. 4 is a schematic view of another conventional amplifier having a dedicated function signal processing circuit,” ’542 patent, col. 4, lines 34-36, QSC argues that “[s]o, even though the inventor spent approximately one column (’542 patent at 1:15 – 2:10) distinguishing between integral ‘amplifiers’ and nonintegral ‘amplifier systems,’ and even though the inventor provided only a single embodiment where the DSP is located within the same housing as the power amplifier, Crest contends that this brief description of FIG. 4 shows that the claimed invention is directed—much more broadly—to any configuration of any amplifier system where a DSP is in the signal path.” QSC’s Resp. Brief [Dkt. 192] at 24.

QSC argues that “the Federal Circuit has made clear: a ‘single sentence in the specification cannot overcome the overwhelming evidence in other parts of the specification [and prosecution history]” *Id.*, quoting *Trustees of Columbia Univ. in City of New York v. Symantec Corp.*, 811 F.3d 1359, 1366 (Fed. Cir. 2016).

(ii) Networked Amplifiers

In response to Crest’s argument *vis-à-vis* networked amplifiers, QSC responds that “these disclosures say nothing about whether the DSP is or is not located in the same housing as the power amplifier. Instead, they deal with how signal-processing functions and parameters may be input to the amplifier.” QSC’s Resp. Brief [Dkt. 192] at 24. QSC says “[f]or example, in describing the prior art, the specification says that ‘signal processing function parameters may be modified by signals input via a program bus 24 from a network of amplifiers (not shown) controlled by a computer or similar

device.’ This says nothing about whether the amplifier’s signal processing circuit is located in the same housing as the power amplifier.” *Id.* at 24-25.

(iii) Claim Differentiation – Claim 6 of the ’544 Patent

QSC urges that “far from supporting Crest, claim 6 demonstrates why the housing limitation *is necessary* in the ’542 patent. The inventor included dependent claim 6 in the ’544 patent but not in the ’542 patent. The inventor, thus, recognized how to claim the housing limitation as a dependent claim when he intended to do so. That the inventor did not do so in the ’542 patent demonstrates that he believed that limitation to *already be present* in the ’542 patent—consistent with what the inventor told the examiner.” *Id.* at 25.

(3) Crest’s Reply Brief

(a) Whether Preamble is Limiting

Crest in reply urges that QSC failed to address the fundamental question of whether preambles are limiting, and urges that QSC thus failed to overcome “the presumption” that preambles are not limiting. Crest’s Reply [Dkt. 193] at 1-2.

In particular, Crest urges that “QSC argues at length that the preamble ‘an amplifier comprising’ should be construed so that it incorporates a housing limitation. * * * However, QSC has failed to even engage the threshold issue of whether the preamble ‘an amplifier comprising’ actually serves as a limitation on the claims such that construction the phrase would even be necessary. [citing cases].” *Id.* at 1.

Crest contends that “QSC has flat out skipped this essential first step. QSC makes zero attempt to show that the preamble ‘an amplifier comprising’ is in fact a limitation on the claims. Instead, QSC’s argument focuses entirely on whether *a housing* – not the preamble ‘an amplifier comprising’ – limits the claim scope. Because QSC has failed to even address the threshold issue of whether the preamble is limiting, QSC cannot overcome the heavy presumption that the preamble “an amplifier comprising” does not limit the claims.” *Id.*

Crest also argues that “QSC tacitly concedes that the preamble ‘an amplifier comprising’ is not limiting because QSC argues that its proposed housing limitation could instead be injected somewhere into the body of the claims. *See* Dkt. 192, pp. 21-23 (“The preamble is the appropriate location for the housing limitation, but other locations are proper too.”). First, however, QSC never previously

disclosed this claim construction position as required by the Court's Patent Rules (Dkt. 37). *See* Dkt. 174 (Joint Claim Construction and Prehearing Statement); Dkt. 184 (Amended Joint Claim Construction and Prehearing Statement). Consequently, QSC's new position that a housing limitation should be read somewhere into the body of the claims is untimely and should not be considered by the Court." Crest's Reply [Dkt. 193] at 2.

Crest further contends that "[s]econd, QSC fails to specify where exactly the housing limitation should be inserted into claim 1. This lack of clarity cuts directly against the entire point of claim construction, which is 'to clarify and when necessary to explain what the patentee covered by the claims' *United States Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997)." *Id.*

(b) Importing Limitations From Specification

Crest argues that even if the preambles are limiting it would be improper to import features described in the specification into the "an amplifier comprising" preamble.

In reply to QSC's argument that a DSP located in the same housing as the power amplifier constitutes "the invention," Crest urges that "QSC mischaracterizes and omits a large important portion of the 'Background of the Invention' section that QSC relies upon to make this argument, including a portion of the very sentence that QSC quotes, which goes on to describe the relationship of a DSP being in the signal path of an amplifier." Crest's Reply [Dkt. 193] at 3.

Specifically, Crest says, "the entire 'Background of the Invention' section of the '542 patent states:

The present invention relates to a digital signal processor located within an amplifier, and more particularly, to *a digital signal processor provided in a signal path of an amplifier* for programming both signal processing functions and associated signal processing function parameters according to signal input into the digital signal processor.

Dkt. 191-2 ('542 patent), col. 1, lines 8-13 (emphasis added)." Crest's Reply [Dkt. 193] at 3. Crest urges that "[c]ontrary to QSC's assertion, this statement above does not say what the invention *is*; it says what the invention 'relates to.'" *Id.*

Crest also urges that "[i]n addition, even if this statement identified the invention of the '542 patent (it does not), there is no mention of an amplifier housing." *Id.*

In particular, Crest contends that "when the phrase 'a digital signal processor located within an amplifier' is considered in the full context of the phrase that follows it, the statement 'and more

particularly' makes it clear that '*within* an amplifier' pertains to '*provided in a signal path* of an amplifier.'

*** Surely, QSC cannot be saying that the '542 patent is all about placing a set of electronic components in a single box. But if that is what QSC contends is the invention of the '542 patent, then QSC is clearly missing the point of placing a DSP in the signal path of an audio amplifier to take advantage of the ability to program the DSP to implement signal processing functions and associated parameters on the audio signal in the signal path.'" Crest's Reply [Dkt. 193] at 3-4.

During the claim construction hearing, Crest presented the following slides in support of its argument:

Crest's Slides During Claim Construction Hearing

QSC Relies Heavily on the '542 Patent's Background to Find a Housing

BACKGROUND OF THE INVENTION

The present invention relates to a digital signal processor located **within** an amplifier,

Background does NOT recite "housing"
... and explains why

BACKGROUND OF THE INVENTION

The present invention relates to a digital signal processor located within an amplifier, and more particularly, to a digital signal processor provided in a signal path of an amplifier **for programming both signal processing functions and associated signal processing function parameters according to signals input to the digital signal processor.**

Why Functionally Equivalent?

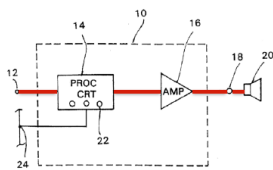


FIG. 3

Integral

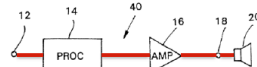


FIG. 4

Interconnected

Because focus is on audio signal path

The rest of the Background makes clear what the '542 Patent is about ...

BACKGROUND OF THE INVENTION

The present invention relates to a digital signal processor located within an amplifier, and more particularly, to **a digital signal processor provided in a signal path of an amplifier** for programming both signal processing functions and associated signal processing function parameters according to signals input to the digital signal processor.

'542 patent discloses two types of "conventional amplifiers"

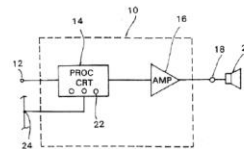


FIG. 3

Integral



FIG. 4

Interconnected

Functionally Equivalent
POSITA Sees No Functional Difference

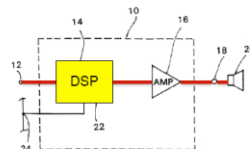


FIG. 3

Integral

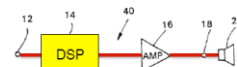


FIG. 4

Interconnected

Crest's Slides During Claim Construction Hearing

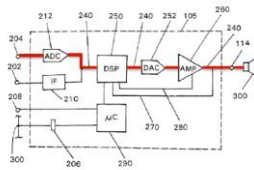
POSITA Sees No Functional Difference

FIG. 2

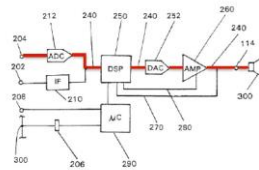
Integral**Because focus is on audio signal path**

FIG. 2 (modified)

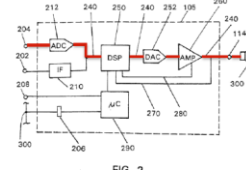
Interconnected**POSITA Sees No Functional Difference**

FIG. 2

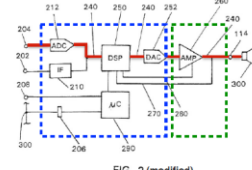
Integral**Because focus is on audio signal path**

FIG. 2 (modified)

Interconnected

For those reading this that may not be familiar with “patent jargon,” “POSITA” is a frequently used initialism for “person of skill in the art.” Crest’s point was that a “person of skill in the art” would see no “functional difference” whether the DSP and power amplifier were located “in the same housing” (or in the “same box”) because the focus is on the audio signal path.

(c) “amplifiers” v. “amplifier systems”

Crest urges that QSC’s argument that the ’542 specification differentiates between “amplifiers” and “amplifier systems” is “decimated by the fact that the specification expressly describes the amplifier 10 in Figure 3 as ‘a conventional amplifier’ and the amplifier system 40 in Figure 4 as “*another* conventional amplifier.” Dkt. 191-2 (’542 patent), 4:31-37 (emphasis added). Accordingly, the ’542 patent refers to both the amplifier 10 and the amplifier system 40 as instances of “an amplifier” (*id.*), and there is zero evidence in the ’542 patent or anywhere else in the intrinsic record that the patentee meant to disclaim or disavow one instance of an amplifier in favor of the other.” Crest’s Reply [Dkt. 193] at 4.

(d) One Embodiment

Replying to QSC’s argument that the ’542 patent discloses only one embodiment in which the DSP is located in the same housing as the power amplifier, Crest says that is “inaccurate.” Crest’s Reply [Dkt. 193] at 4.

Crest says “[f]or example, the ’542 patent describes ‘[a] preferred embodiment’ (without any mention of a housing) and then describes ‘an alternative embodiment’ (again, with no mention of a housing). *See* Dkt. 191-2 (’542 patent), col. 2, lines 25-41. And, as noted above, the specification of the

‘542 patent also describes two embodiments of an amplifier – one amplifier in which the components are ‘integral’ in one housing and another amplifier in which the components are distributed in a network and not necessarily in a single housing. *Id.* at col. 4, lines 31-36.” Crest’s Reply [Dkt. 193] at 4-5.

Crest urges that claims “generally are not limited to any particular embodiment disclosed in the specification, even where only a single embodiment is disclosed.” Crest’s Reply [Dkt. 193] at 5.

Crest also urges that “the specification of the ‘542 patent states that the DSP is merely ‘*preferably* mounted on an amplifier chassis within an amplifier housing.’ Dkt. 191-2, col. 2, lines 42-44 (emphasis added). Although including the DSP in the housing is described as preferred, ‘it is improper to read limitations from a preferred embodiment described in the specification – even if it is the only embodiment – into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.’ *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004). A person of ordinary skill would understand that the DSP does not have to be inside the same housing as the power amplifier. *See* Dkt. 191-11 (Pirkle Declaration), ¶ 24.” Crest’s Reply [Dkt. 193] at 5

(4) Discussion

The Federal Circuit has recently reiterated that “[c]laim terms are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art when read in the context of the specification and prosecution history. * * * We have recognized ‘only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.’” *Unwired Planet, LLC v. Apple Inc.*, 829 F.3d 1353, 1358 (Fed. Cir. 2016). “To act as its own lexicographer, a patentee must ‘clearly set forth a definition of the disputed claim term’ other than its plain and ordinary meaning. * * * It is not enough for a patentee to simply disclose a single embodiment or use a word in the same manner in all embodiments, the patentee must ‘clearly express an intent’ to redefine the term.” *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Although there have certainly been instances in which a patentee, in the specification, described an embodiment, or a feature, or a quality as fundamental to the invention itself, *see e.g., SciMed Life Systems, Inc. v. Advanced Cardiovascular Systems, Inc.*, 242 F.3d 1337, 1340-42 (Fed. Cir.

2001)(collecting cases), this is not one of those cases. In the '542 patent, the phrase “present invention” is used nine times – most frequently in the context of “preferred embodiment of the present invention.”

QSC points to the first clause in the sentence “[t]he present invention relates to a digital signal processor located within an amplifier, and more particularly, to a digital signal processor provided in a signal path of an amplifier for programming both signal processing functions and associated signal processing function parameters according to signals input to the digital signal processor.” But, in context, that does not indicate that the entirety of the “invention” is locating a DSP in the same housing as a power amplifier, as QSC asserts. QSC cites *Verizon Services Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007) “[w]hen a patent thus describes the features of the ‘present invention’ as a whole, this description limits the scope of the invention.” But neither the foregoing portion of the '542 patent, nor any other portion that QSC has cited, describe the invention “as a whole” in terms of locating a DSP in the same housing as a power amplifier.

Nor does the specification draw a clear distinction between “amplifier” and “amplifier system,” as QSC contends. The term “amplifier system” is used five times in the specification of the '542 patent, solely in two paragraphs that describe the prior art as illustrated in Fig. 4. '542 patent, col. 1, line 66-col. 2, line 19. And begins the discussion with the phrase “conventional amplifier system” In contrast, the term “amplifier” is used 116 times in the specification and claims, but QSC has not shown that, in context, the term “amplifier” was intended to limit the described or claimed invention to locating a DSP in the same housing as a power amplifier.

With respect to describing “one embodiment,” the Federal Circuit has consistently reiterated that “although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments. * * * In particular, we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment. * * * That is not just because section 112 of the Patent Act requires that the claims themselves set forth the limits of the patent grant, but also because persons of ordinary skill in the art rarely would confine their definitions of terms to the exact representations depicted in the embodiments.” *Phillips*, 415 F.3d at 1323.

QSC simply has not shown that the specification mandates construing “an amplifier comprising” (or any other term or phrase in the ’542 patent claims) as limited to “a digital signal processor and a power amplifier in the same housing.”

(5) Prosecution History

Crest urges that the prosecution histories of the ’542 and ’544 patents are consistent with construed “amplifier” according to its ordinary meaning. Crest’s Op. Brief [Dkt. 191] at 13-14. As discussed further below, QSC urges that differences between the prosecution histories of those patents support its current contention that “amplifier” in the preambles of the ’542 patent claims should be construed differently from “amplifier” in the preamble of claim 1 of the ’544 patent. Thus, both parties urge that the prosecution history of the ’542 patent supports their respective proposed constructions.

(a) Prosecution History of the ’542 Patent

Exhibit D [Dkt. 191-4] to Crest’s Opening is the prosecution history of the ’542 patent. The ’542 patent issued on July 29, 1997, from Appl. No. 546,839, filed October 23, 1995, which was a continuation of application Serial No. 336,481, filed November 9, 1994. In particular, the ’839 application was filed as a “file wrapper continuing application” of the parent ’481 application under U.S. Patent & Trademark Office (PTO) practice. Ex. D [Dkt. 191-4] CREST 000482. At the time, that practice, in essence, permitted the filing of a continuing application using the “file wrapper” of the parent application.

During prosecution of the parent ’481 application, the PTO examiner, in an Office Action dated April 21, 1995, rejected claims 1-4, 8-15 and 19-23 as being unpatentable over U.S. Patent No. 5,313,524 to Van Hulle *et al.* reasoning:

Refer to fig. 1 of Van Hulle et al. An audio signal processor 2 is contained with a microprocessor 7, including a memory, (not shown ;see column 5 ,second paragraph of the disclosure of Van Hulle et al.) that controls the signal processor 2 based on external digital and analog signals. The difference between the claims and Van Hulle et al. is that in the reference the amplification function is also within the controlled signal processor rather than a separate unit within

the same housing as claimed. However, the two arrangements are functionally equivalent and it would be an obvious matter of design choice whether to integrate the processor and the amplifier based, say, on the output power requirements of the system. Further, the difference may to some extent be just that Van Hulle et al. is not concerned with the details of the ~~processor and amplification circuitry itself as much as its~~ control.

Ex. D [Dkt. 191-4] CREST 000532-34. However, the PTO examiner also objected to claims 5-7 and 16-18 as being dependent upon a rejected base claim, but indicated that those claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. CREST 000534. The applicant responded to that rejection by filing a “file wrapper continuing application,” namely the ’839 application ultimately resulting in the ’542 patents-in-suit.

What occurred during prosecution of the ’839 application is clear. Crest and QSC, however, interpret the prosecution history differently.

As filed, application claim 1 of the ’839 application was the same claim as in the parent ’481 application, and called for:

1. An amplifier comprising:
an amplifier housing;
a power amplifier; and
a digital signal processor module connected to
the power amplifier and located within the amplifier
housing for defining at least one signal processing
function for the amplifier.

Ex. D [Dkt. 191-4] CREST 000467. Thus, as filed, claim 1 called for “an amplifier housing” as a claim limitation, and further called for “a digital signal processor module connected to the power amplifier and located within the amplifier housing * * *.”

Additionally, application claims 2-4 called for:

2. The amplifier of claim 1, wherein the
digital signal processor module comprises a programmable
digital signal processor for storing a program that
defines the signal processing function which modifies an
input signal according to the signal.

3. The amplifier of claim 2, wherein the digital signal processor comprises a non-volatile memory for storing at least one program therein.

4. The amplifier of claim 2, wherein the digital signal processor comprises an input for receiving control signals for defining a signal processing function and signal processing function parameters and an output for outputting control signals for modifying performance of the power amplifier.

Ex. D [Dkt. 191-4] CREST 000467.

In an Office Action dated February 14, 1996, the PTO examiner again rejected claims 1-4, 8-15, and 19-23 under 35 U.S.C. § 103 as having been obvious over U.S. Patent No. 5,313,524 to Van Hulle *et al.* The examiner reasoned:

Refer to fig. 1 of Van Hulle et al. An audio signal processor 2 is contained with a microprocessor 7, including a memory (not shown ;see column 5 ,second paragraph of the disclosure of Van Hulle et al.) that controls the signal processor 2 based on external digital and analog signals. The difference between the claims and Van Hulle et al. is that in the reference the amplification function is also within the controlled signal processor rather than a separate unit within the same housing as claimed. However, the two arrangements are functionally equivalent and it would be an obvious matter of design choice whether to integrate the processor and the amplifier based ,say, on the output power requirements of the system. Further, the difference may to some extent be just that Van Hulle et al. is not concerned with the details of the processor and amplification circuitry itself as much as its control.

Ex. D [Dkt. 191-4] CREST 000485-86. Namely, the PTO examiner relied on the same reasons for rejecting the claims as in the parent '481 application. Claims 5-7 and 16-18 were again objected to as being dependent upon a rejected base claim, but the examiner again indicated those claims were allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

In a response (Amdt. B) dated July 18, 1996, *inter alia*, claim 1 was amended to provide (material in brackets deleted, material underlined added, per PTO practice):

1. (Amended) An amplifier comprising:
 an amplifier housing;
 a power amplifier; and
 a digital signal processor [module] capable of
receiving and storing at least one of an algorithm which defines
at least one signal processing function and signal processing
function parameters.
the digital signal processor being connected to the
 power amplifier and located within the amplifier housing [for
 defining at least one signal processing function for the
 amplifier].

Ex. D [Dkt. 191-4 CREST 000492. Crest acknowledges that “at this point in the prosecution history of the ‘542 patent, the patentee did attempt to claim an amplifier housing as part of the amplifier invention of the ‘542 patent.” Crest’s Op. Brief [Dkt. 191] at 14.

Additionally, application claim 4 was amended to provide (material in brackets deleted, material underlined added, per PTO practice):

4. (Amended) The amplifier of claim [2] 1, wherein
 the digital signal processor comprises [an] a first input for
 receiving [control signals for defining a signal processing
 function] at least one of the algorithm and signal processing
 function parameters and an [output] input/output port for
receiving performance characteristics of the power amplifier and
 for [outputting] transmitting control signals for modifying the
 performance of the power amplifier.

Ex. D [Dkt. 191-4] CREST 000493.

The actual pages in the prosecution history of Ex. D [Dkt. 191-4] at this juncture appear to have been “reordered,” namely those pages do not appear to be in the actual sequence expected from a “precise” copy of the PTO prosecution history. Unfortunately, that is not uncommon.

In Ex. D [Dkt. No. 191-4], the response of July 18, 1996, begins on CREST 000491 and carries through to CREST 000494, where the last item on the page is an incomplete presentation of application claim 11 ending with “receiving at least one of the” – namely, that sentence is not completed. The next page in Ex. D is CREST 000495 which is a signature page having a mailing

certification stamp dated December 17, 1996 – namely, the date of the subsequent amendment/response discussed below.

It is believed that the remainder of the response of July 18, 1996, begins on CREST 000505 which starts at the top of the page with what appears to be the remainder of application claim 11, along with amended application claim 12, and added claims 24-26.

Assuming that CREST 000505-509 actually represents the remainder of the response of July 19, 1996 (which seems to be confirmed by the context and the signature page, CREST 000509), the applicant argued over the rejection of application claims 1-4, 8-15 and 19-23, that:

The Examiner contends that the Van Hulle reference discloses an audio signal processor 2 which is controlled by a microprocessor 7 (and memory) where only the circuit partitioning differs from the claims as originally filed. In response, Applicant has amended the claims of the instant application and respectfully submits that the amended claims are patentable over the Van Hulle reference.

Conventional amplifiers having signal processing circuits are comprised of analog and digital components on a printed circuit board. The signal processing function parameters, for example, crossover frequency and amplitude, can be changed by adjusting control knobs provided on an amplifier housing which are operatively connected to the components of the signal processing circuit. Alternatively, the signal processing function parameters may be modified by signals input via a computer or similar device under program control.

However, with the conventional amplifiers as discussed above, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed. Although the user can change the signal processing function parameters as described above, it is often necessary or desirable to change the signal processing function or even combine several different signal processing functions in the signal processing circuit. This is not possible with conventional amplifiers.

The system of the Van Hulle reference employs a conventional amplifier as described above where only the function parameters of the signal processor can be modified. Indeed, in

the system of the Van Hulle reference, "[t]he audio signal is processed in the signal processing circuit 2 in response to setting signals I in the form of gain factors, filter coefficients and the like ..." (Col. 4, lines 52-55). The "gain factors, filter coefficients and the like" described in the Van Hulle reference are merely the function parameters of the analog and/or digital circuits forming the processing function, which circuits are fixed on a circuit board.

Conversely, the novel combination of the present invention as recited in amended claim 1 requires an amplifier comprising a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters. Thus, the amplifier of the present invention can receive an algorithm which defines an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacture. In addition, the digital signal processor of the amplifier as claimed can receive signal processing function parameters if desired.

The Van Hulle reference does not teach or suggest an amplifier comprising a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters as recited in amended claim 1. Indeed, the Van Hulle reference teaches a fixed function circuit where only the parameters of the function may be modified. Therefore, one skilled in the art would not have been led to the novel combination as recited in amended claim 1 in view of the Van Hulle reference. Accordingly, Applicant requests that the Examiner's 35 U.S.C. §103 rejection of claim 1 be withdrawn.

Further, amended claims 3-12 all depend on claim 1 and contain all of the limitations of claim 1 as well as other limitation(s) which, for the reasons articulated above, also define patentable combinations. Therefore, Applicant respectfully requests that the Examiner's 35 U.S.C. §103 rejections of claims 3-12 be withdrawn.

Ex. D [Dkt. 191-4 CREST 000506-08.

In a subsequent Office Action dated September 17, 1996, the PTO examiner again rejected claims 1, 3, 8-12, 24 and 25 under 35 U.S.C. § 103 as being unpatentable over the Van Hulle *et al.* reference. The PTO examiner reasoned:

The language of the first Office action is incorporated herein by reference. In regard to the amendments made and arguments presented, the microprocessor of van Hulle *et al.* stores three different programs which may be read as the algorithms claimed. In re claims 24-25, the programs will include at least one or two of the claimed functions.

Ex. D [Dkt. 191-4] CREST 000499. Claims 4-7 and 26 were objected to as being dependent upon a rejected base claim, but were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

In a response dated December 19, 1996, application claim 4 (which became patent claim 1)⁵ was amended to provide (material in brackets deleted, material underlined added, per PTO practice):

1. ~~4.~~ (Twice Amended) An amplifier comprising:
a power amplifier; and
a digital signal processor capable of receiving and
storing at least one of an algorithm which defines at least one
signal processing function and signal processing function
parameters.
the digital signal processor being connected to the
power amplifier and having [The amplifier of claim 1, wherein the
digital signal processor comprises] a first input for receiving
at least one of the algorithm and signal processing function
parameters and an input/output port for receiving performance
characteristics of the power amplifier and for transmitting
control signals for modifying the performance of the power
amplifier.

⁵ Pursuant to PTO regulations, the claims in pending patent applications are number seriatim, and those numbers do not change during prosecution. After a PTO examiner determines that the pending application claims are drawn to patentable subject matter, the PTO examiner “renumbers” the claims, as indicated above by the slash through “4” and the handwritten “1.” Thus, “application claim 4” became “patent claim 1” in the ’542 patent.

Ex. D [Dkt. 191-4] CREST 000501-02. Of importance, here, the prior limitations in application claim 1 calling for (a) “an amplifier housing” and (b) providing that the “digital signal processor being connected to the power amplifier” was “located within the amplifier housing,” were not included in the amendment to application claim 4.

Thus, application claim 4, when issued as patent claim 1, did not require either (a) “an amplifier housing” or (b) that the “digital signal processor being connected to the power amplifier” was “located within the amplifier housing.”

Additionally, prior dependent application claim 7 (which became independent patent claim 5) was amended to provide (material in brackets deleted, material underlined added, per PTO practice):

5. (Twice Amended) [The amplifier of claim 1, further comprising] An amplifier comprising:
a power amplifier; and
a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters, the digital signal processor being connected to the power amplifier;
a current detector for detecting current delivered to a load from the power amplifier and a voltage detector for detecting the voltage supplied to the load from the power amplifier,
wherein the digital signal processor further comprises an input port for receiving the detected current and voltage, and
wherein the current detector and voltage detector are operatively connected to the power amplifier and the digital signal processor, and
wherein the digital signal processor calculates the impedance of the load.

Ex. D [Dkt. 191-4] CREST 000502.

Prior dependent application claim 7 was dependent from prior application claim 1. As a dependent claim, application claim 7 included the limitations of application claim 1, including the limitations calling for (a) “an amplifier housing” and (b) providing that the “digital signal processor being connected to the power amplifier” was “located within the amplifier housing.” Those limitations were not included in the amendment to application claim 7, which, as amended, became patent claim 5.

Further, application claim 26 (which became patent claim 13) was amended to provide (material in brackets deleted, material underlined added, per PTO practice):

~~26.~~ ^{13.} (Amended) [The amplifier of claim 1, further comprising] An amplifier comprising:
a power amplifier; and
a digital signal processor capable of receiving and
storing at least one of an algorithm which defines at least one
signal processing function and signal processing function
parameters, the digital signal processor being connected to the
power amplifier;
a current detector for detecting current delivered to a load from the power amplifier and a voltage detector for detecting the voltage supplied to the load from the power amplifier,
wherein the digital signal processor further comprises an input port for receiving the detected current and voltage, and
wherein the current detector and voltage detector are operatively connected to the power amplifier and the digital signal processor, and
wherein the digital signal processor calculates the amount of power supplied to the load by the power amplifier based on the detected voltage and the detected current.

Ex. D [Dkt. 191-4] CREST 000503-04.

Again, prior dependent application claim 26 was dependent from prior application claim 1, and therefore included the prior limitations in parent application claim 1 calling for (a) “an amplifier housing” and (b) providing that the “digital signal processor being connected to the power amplifier” was “located within the amplifier housing.” Those limitations were not included in the amendment to application claim 26, which, as amended, became patent claim 13.

The applicant urged:

Reconsideration and allowance of this application are respectfully requested. Claim 1 has been canceled. Claims 3, 4, 5, 7, 8, 12 and 24-26 have been amended and are submitted for the Examiner's consideration.

Pursuant to 37 CFR §1.116(a), Applicant submits that the amendments made hereinabove merely cancel claims, adopt the Examiner's suggestions and remove issues for appeal and, therefore, the above amendments are proper and should be entered.

At pages 2-3 of the Office Action, the Examiner rejected claims 1-3, 8-12 and 24-25 under 35 U.S.C. § 103 as being unpatentable over the VanHulle reference. The Examiner indicated that claims 4-7 and 26 would be allowable if rewritten in independent form. In response, the limitations of canceled claim 1 have been added to claims 4, 7 and 26 to produce three independent claims as suggested by the Examiner. Amended claims 3, 5, 6, 8-12, 24 and 25 depend from claim 4. Accordingly Applicant submits that claims 3-12 and 24-26 are patentable over the art of record and should be allowed.

Ex. D [Dkt. 191-4] CREST 000504.

A Notice of Allowability was subsequently issued on January 3, 1997, Ex. D [Dkt. 191-4] CREST 000511, indicating at application claims 2-12 and 24-26 were allowable. The '542 patent subsequently issued on July 29, 1997.

(b) Crest's Opening Brief

Crest urges that "[b]y removing the limitation of 'an amplifier housing,' the patentee chose to claim an amplifier without regard to whether or not the amplifier includes an amplifier housing. The fact that the 'amplifier housing' limitation was removed from the claimed 'amplifier' further establishes that an 'amplifier housing' is one optional feature of 'an amplifier,' which is consistent with the amplifiers depicted in FIGS. 3 and 4 of the '542 patent." Crest's Op. Brief [Dkt. 191] at 14.

QSC, in the Amended Joint Claim Construction and Prehearing Statement [Dkt. 184], urged that "[t]he term 'an amplifier comprising' not only states a necessary and defining aspect of the alleged invention claimed in the '542 Patent, but the applicant relied on this limitation in distinguishing over prior art during prosecution of the application that issued as the '542 Patent." [Dkt. 184] at 2.

Crest urges the opposite. Crest notes that the February 14, 1996, Office Action above, the Examiner's rejection reasoned that the housing limitations did not patentably define over the Van Hulle *et al.* reference. Crest points to the following portion of the examiner's rejection:

The difference between the claims and Van Hulle *et al.* is that in the reference the amplification function is also within the controlled signal processor rather than a separate unit within the same housing as claimed. However, the two arrangements are functionally equivalent and it would be an obvious matter of design choice whether to integrate the processor and the amplifier based, say, on the output power requirements of the system.

Crest notes that the examiner reiterated the same rejection in the Office Action of September 17, 1996 (“The language of the first Office Action is incorporated herein by reference.”). Crest further notes that the examiner found that dependent application claim 4 (as well as application claims 5-7 and 26) were allowable.

Crest urges that “[i]n response, the applicant amended the claims so that the independent claims included the limitations of claim 4. But because the housing limitation previously recited in the independent claims was found not to be a distinguishing feature, the applicant removed the limitation concerning a housing. * * * Thus, any argument by Defendant that a housing limitation was necessary for patentability in untenable because the Examiner unequivocally stated that the previous housing limitations did not distinguish the claims from the prior art. Therefore, Crest Audio’s proposed construction is consistent with the prosecution history, and Defendant’s efforts to manufacture a housing limitation is not.” Crest’s Op. Brief [Dkt. 191] at 15-16.

(c) QSC’s Response

QSC responds that the “prosecution history compels the inclusion of the housing limitation” QSC’s Resp. Brief [Dkt. 192] at 13.

QSC notes that in the original ’481 application, and in the subsequent “file wrapper continuation” ’839 application, claim 1 included a limitation calling for “an amplifier housing” and a limitation calling for “a digital signal processor module connected to the power amplifier and located within the amplifier housing.” QSC urges that “[t]hus, three separate times—in the original ’481 application, in the original ’839 application, and in the amended claims of the ’839 application—the inventor claimed that his invention was an amplifier with a DSP in the same housing as the power amplifier.” QSC’s Resp. Brief [Dkt. 192] at 14.

Pointing to the September 17, 1996, Office Action, QSC notes that the examiner indicated that application claims 4-7 and 26 would be allowable if “rewritten in independent form including all of the limitations of the base claim and any intervening claim.” QSC emphasizes “all” and that “all” included the housing limitation: “not most, a majority, or some of the limitations, but ‘*all*’ of the limitations, which by definition includes the housing limitation.” *Id.*

QSC urges that “[t]he applicant agreed to re-write his claims and affirmatively represented to the examiner that he had—as directed—incorporated the limitations from the rejected base claims.” *Id.* QSC further urges that “[t]he applicant specifically represented that ‘[t]he Examiner indicated that

claims 4–7 and 26 would be allowable if rewritten in independent form. In response, *the limitations of canceled claim 1 have been added* to claims 4, 7, and 26 to produce three independent claims *as suggested by the Examiner.*” *Id.* quoting December 19, 1996 amendment (emphasis by QSC).

QSC argues that “ ‘the limitations of canceled claim 1’ unambiguously included the housing limitation. Indeed, the inventor even referenced the examiner’s suggestion to include ‘*all* of the limitations’ of the rejected based claim.” QSC’s Resp. Brief [Dkt. 192] at 15. QSC argues that “[n]owhere did the inventor tell the examiner that despite the inventor’s representation, he was, in fact, significantly changing the scope of his claims. To the contrary, the applicant affirmatively represented that his newly drafted claims had the same scope as rejected claim 1 plus the applicable dependent claims.” *Id.*

QSC points to *Edwards Lifesciences LLC v. Cook Inc.*, 582 F.3d 1322, 1330-31 (Fed. Cir. 2009), urging that “[o]n facts very similar to here, the Federal Circuit held that when an inventor deletes claim language from pending claims during prosecution but represents to the Patent Office that the claim language remains, the deleted limitation must be read back in.” QSC’s Resp. Brief [Dkt. 192] at 15. QSC also points to *Alloc, Inc. v. Int’l Trade Comm’n*, 342 F.3d 1361, 1371-72 (Fed. Cir. 2003), as being “instructive.” QSC’s Resp. Brief [Dkt. 192] at 16.

QSC argues that “[t]his same thing is going on here. The inventor told the PTO that he had incorporated the limitations from original claim 1 into the dependent claims. Thus, the inventor represented to the PTO that he had not broadened the scope of the claims. Based on these representations, the PTO allowed the claims. Now, for this litigation, Crest seeks to ignore the inventor’s representations that secured allowance and to broaden the claims by excluding the housing limitation. As in *Edwards* and *Alloc*, the Court should reject Crest’s attempt to recast the scope of the claims. QSC’s Resp. Brief [Dkt. 192] at 16-17.

With respect to Crest’s comment that the examiner did not rely on the housing limitation to grant the ’542 patent, QSC says “[w]hether true or not, this is irrelevant, as it is not the examiner’s reliance that is relevant, but rather, the inventor’s representations about claim scope. As the Federal Circuit put it in *Seachange Int’l, Inc. v. C-COR, Inc.*, [413 F.3d 1361, 1374 (Fed. Cir. 2005)] ‘[t]he fact that the Examiner did not indicate reliance ... is of no consequence. An applicant’s argument made during prosecution may lead to disavowal of claim scope even if the Examiner did not rely on the argument.’ ” QSC’s Resp. Brief [Dkt. 192] at 17.

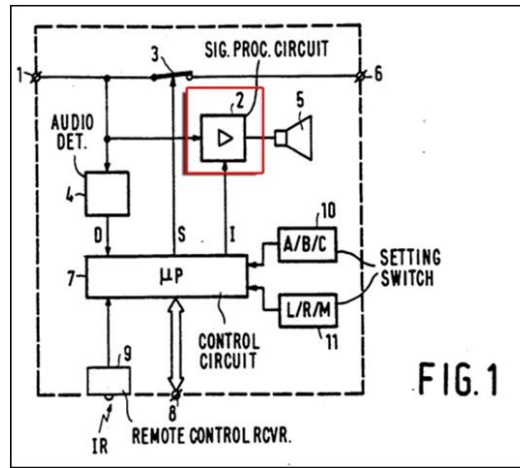
QSC also points to Crest’s rebuttal brief on claim construction filed in 2014 at an earlier stage of this litigation [Dkt. 128 at 5] where Crest urged, in relation to original application claim 1, “[w]hile this original claim 1 *does* recite ‘an amplifier housing’ and that the digital signal processor module is ‘located within the amplifier housing,’ it *does not* state that the power amplifier element is also located within the amplifier housing. Original claim 1 only recites that the digital signal processor module is ‘connected’ to the power amplifier without any reference to whether the power amplifier is inside or outside the claimed amplifier housing. So, QSC’s faulty argument that the ‘542 patent is restricted only to amplifiers with a digital signal processor and the power amplifier enclosed in a single housing is not supported by original claim 1.” Dkt. 128 at 5.

QSC says that “Crest’s argument—that this claim requires only that the DSP be inside the amplifier housing and connected to the power amplifier, but does not require that the power amplifier itself be in the amplifier housing—tortures the English language. QSC’s Resp. Brief [Dkt. 192] at 17. QSC urges that “[t]he claim limitation is ‘*amplifier* housing,’ not just ‘housing.’ Surely, if an ‘amplifier housing’ houses anything, it is an amplifier. Thus, this claim clearly contemplated that *both* the power amplifier and the DSP would be found within the same ‘amplifier housing.’” *Id.* at 17-18.

QSC additionally contends that “Crest misleadingly contends that the examiner determined that there was no functional difference between the amplifier with a housing containing both the DSP and the power amplifier, and an amplifier system with a DSP that was not in the same housing as the power amplifier,” *id.* at 18, again referring to Crest’s earlier brief filed in 2014 [Dkt. 128]. QSC urges that Crest, in its earlier brief, misquoted the examiner’s February 1996 Office Action, and changed the meaning. *Id.* at 18.

According to QSC, the examiner “was not discussing the housing limitation at all.” *Id.* QSC says that “[i]nstead, the examiner rejected the then-pending claims based on Van Hulle, and as noted that in that reference, the amplifier and the signal processor were *the same device*. This is shown in Van Hulle’s Figure 1 (highlighted, right), which the examiner was referring to in his comments.” *Id.* at 19.

Van Hulle's Fig. 1, as annotated in QSC's brief:



According to QSC, “[t]he examiner noted that having the same device perform both the amplification function and the processing function was functionally equivalent to having a separate DSP and power amplifier, as claimed in the then-pending claims. In the examiner’s words, ‘[t]he difference between the claims and Van Hulle et al is that in the reference the amplification function is also within the controlled signal processor rather *than a separate unit within the same housing as claimed*. However, the two arrangements are functionally equivalent....’ ” QSC’s Resp. Brief [Dkt. 192] at 19.

QSC urges that “[a]s is clear from the full quote, the two ‘arrangements’ that were functionally equivalent were (1) a power amplifier as the *same device* as the signal processor and (2) a power amplifier as a *separate device* from the signal processor. Contrary to Crest’s contention, the examiner did not say that the amplifier housing was not a ‘patentably distinct limitation.’ ” *Id.*

PATENT APPLICATION SERIAL NO. 336481

1. An amplifier comprising:
an amplifier housing;
a power amplifier; and
a digital signal processor module connected to
amplifier and located within the amplifier
or defining at least one signal processing
for the amplifier.

At pages 2-3 of the Office Action, the Examiner rejected claims 1-3, 6-12 and 24-25 under 35 U.S.C. § 103 as being unpatentable over the Vanhulle reference. The Examiner indicated that claims 4-7 and 26 would be allowable if rewritten in independent form. In response, the limitations of canceled claim 1 have been added to claims 4, 7 and 26 to produce three independent claims as suggested by the Examiner. Amended claims 1, 5, 6, 8-12, 24 and 25 depend from claim 4. Accordingly Applicant submits that claims 1-12 and 24-26 are patentable over the art of record and should be allowed.

QSC's Claim Construction Presentation Slides

IN THE CLAIMS:

Please cancel claims 7 and 13-23 without prejudice.

Please amend the claims as follows:

1. (Amended) An amplifier comprising:

an amplifier housing;

a power amplifier; and

a digital signal processor [module] capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters.

the digital signal processor being connected to the power amplifier and located within the amplifier housing [for defining at least one signal processing function for the amplifier].

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

An amplifier 100 according to a preferred embodiment of the present invention is shown in Fig. 1 and includes an amplifier housing 105. The amplifier housing 105 contains an amplifier contr. has an AC power connector 112, a plural ports 114 and a plurality of convention 116 for controlling volume and gain, fo control panel 110 also includes a digit processor module 200.

QSC Ex. B at QSC00-0088

QSC Ex. B at QSC00-0088

However, QSC fails to acknowledge that the Patent Office had already dismissed the housing limitation as being a patentable feature of the invention. In a February 1996 Office Action, the examiner issued a single-reference obviousness rejection of original claim 1 and explained that "[t]he difference between the claims and Van Hulle *et al.* is that the reference in the amplification function is also within the controlled signal processor rather than a separate unit within the same housing as claimed." Dkt. 191-4, CREST 000484-486. The examiner further stated that "[h]owever, the two arrangements are functionally equivalent and it would be an obvious matter of design choice whether to integrate the processor and the amplifier based, say, on the output requirements of the system." *Id.*

This statement means that, although the Van Hulle reference does not disclose any housing, the examiner found no functional difference between a configuration with a DSP in the same housing as a power amplifier and a configuration with the DSP not in the same housing as the power amplifier. This conclusion enabled the examiner to assert the Van Hulle reference

Refer to Fig. 1 of Van Hulle *et al.* An audio signal processor 2 is contained with a microprocessor 7, including a memory (not shown; see column 3, second paragraph of the disclosure of Van Hulle *et al.*) that controls the signal processor 2 based on external digital and analog signals. The difference between the claims and Van Hulle *et al.* is that in the reference the amplification function is also within the controlled signal processor rather than a separate unit within the same housing as claimed. However, the two arrangements are functionally equivalent and it would be an obvious matter of design choice whether to integrate the processor and the amplifier based, say, on the output power requirements of the system. Further, the difference may to some extent be just that Van Hulle *et al.* is not concerned with the details of the processor and amplification circuitry itself as much as its control.

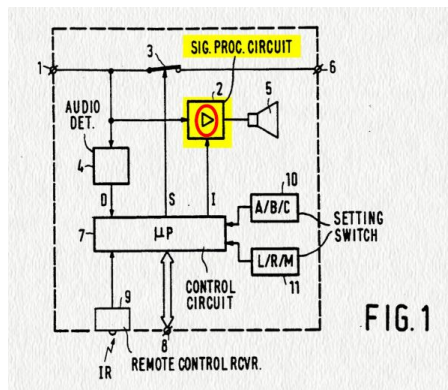
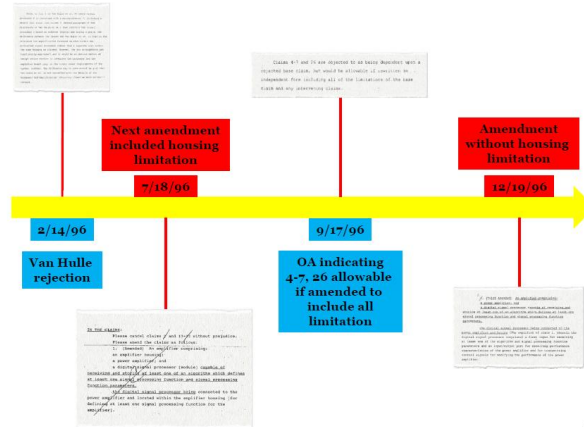


FIG. 1

Refer to Fig. 1 of Van Hulle *et al.* An audio signal processor 2 is contained with a microprocessor 7, including a memory (not shown; see column 3, second paragraph of the disclosure of Van Hulle *et al.*) that controls the signal processor 2 based on external digital and analog signals. The difference between the claims and Van Hulle *et al.* is that in the reference the amplification function is also within the controlled signal processor rather than a separate unit within the same housing as claimed. However, the two arrangements are functionally equivalent and it would be an obvious matter of design choice whether to integrate the processor and the amplifier based, say, on the output power requirements of the system. Further, the difference may to some extent be just that Van Hulle *et al.* is not concerned with the details of the processor and amplification circuitry itself as much as its control.

QSC's Claim Construction Presentation Slides



(d) Crest's Reply

Crest replies that “[t]he crux of QSC’s prosecution history argument is that the ‘542 patent must include the limitation of an amplifier housing containing both a DSP and a power amplifier because that allegedly is what Crest told the Patent Office during prosecution of the application that became the ‘542 patent. * * * However, QSC is mistaken and misrepresents the prosecution history.” Crest’s Reply [Dkt. 193] at 5.

Crest argues that application claim 1 never required a DSP and power amplifier in the same housing. Crest urges that “[a]lthough the original claim 1 does recite ‘an amplifier housing’ and that the digital signal processor is ‘located within the amplifier housing,’ it *does not* state that the power amplifier element is also located within that same amplifier housing. * * * Original claim 1 recites merely that the digital signal processor module is ‘connected’ to the power amplifier without any reference to whether the power amplifier is inside or outside that amplifier housing. * * * Because original claim 1 includes the word ‘comprising’ in the preamble, there is nothing that would permit [*sic*. “preclude”?] the power amplifier from residing in some other enclosure as long as it remained connected to the digital signal processor located within its amplifier housing. * * * So QSC’s faulty argument that the ‘542 patent is restricted to only amplifiers with a DSP and the power amplifier enclosed within a single housing is not even actually supported by original claim 1 (which is not even ultimately dispositive anyway for the additional reasons stated herein).” *Id.* at 6.

With respect to the amendments during prosecution, Crest says that “QSC fails to acknowledge that the Patent Office had already dismissed the housing limitation as being a patentable feature of the invention. In a February 1996 Office Action, the examiner issued a single-reference obviousness rejection of original claim 1 and explained that ‘[t]he difference between the claims and Van Hulle *et al.* is that the reference in the amplification function is also within the controlled signal processor rather than a separate unit within the same housing as claimed.’ Dkt. 191-4, CREST’ 000484-486. The examiner further stated that ‘[h]owever, the two arrangements are functionally equivalent and it would be an obvious matter of design choice whether to integrate the processor and the amplifier based, say, on the output requirements of the system.’” Crest’s Reply [Dkt. 193] at 7.

Crest says that “[t]his statement means that, although the Van Hull reference does not disclose any housing, the examiner found no functional difference between a configuration with a DSP in the same housing as a power amplifier and a configuration with the DSP *not* in the same housing as the power amplifier. This conclusion enabled the examiner to assert the Van Hulle reference against original claim 1 in a single-reference obviousness rejection under 35 U.S.C. § 103, which the examiner could not have otherwise done if the examiner saw a patentable distinction between a DSP not in a single housing with the power amplifier versus an a [*sic.*] DSP in a single housing with the power amplifier.” *Id.*

Crest urges that “[t]he consequence of the examiner’s statement is that the amplifier housing element in claim 1 was not deemed a limitation material to patentability, meaning that its omission in the amendment of claim 4 (and issued claims 5 and 13) was and is a nonissue.” *Id.* at 7-8.

Crest adds that “[w]e know this conclusion to be the case because the examiner did not reject amended claim 4 (or issued claims 5 and 13) for omitting the housing element. Instead, the examiner issued a Notice of Allowability on January 3, 1997 and explicitly referenced the prior ‘amendment filed on December 19, 1996.’ * * * So for QSC to allege deception or trickery by Crest is really an improper and untimely inequitable conduct argument and a flawed attempt to rewrite history, which should be rejected.” *Id.* at 8.

With respect to *Edwards* and *Alloc*, Crest argues that in both cases the patentee amended a claim during prosecution to delete a word from a claim limitation. Crest urges that “[d]espite the words being removed, the terms were construed so as to require the omitted words *because statements in the specifications clearly required the removed words to be present in the claims.* * * * In the present case,

however, the specification of the '542 patent does not require the term 'an amplifier' to include a housing limitation, as discussed in Crest's opening brief." Crest's Reply [Dkt. 193] at 8.

Additionally, Crest urges that in *Edwards*, the patentee had stated in remarks accompanying the claim amendment that the claimed "define[d]" a limitation that included the word deleted in the claim amendment. Crest urges that in *Alloc*, the patentee had relied on the deleted limitation to distinguish the claims from prior art. Crest urges that it "never represented to the Patent Office that 'an amplifier' must include a housing limitation, and a housing limitation was never relied upon for patentability. Thus, *Edwards* and *Alloc* are not applicable here." *Id.* at 9. Crest urges that *Seachange* is not applicable for the same reason. *Id.*

Crest presented the following slides during the claim construction hearing to illustrate the foregoing:

Crest's Claim Construction Presentation Slides

"Housing" Removed from Prosecution Claims 4, 7, & 26 (Issued Claims 1, 5, & 13)

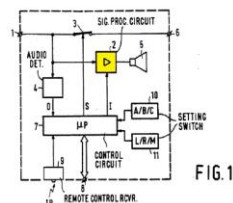
1. An amplifier comprising:
a power amplifier; and
a digital signal processor capable of receiving and storing
at least one of an algorithm which defines at least one
signal processing function and signal processing func-
tion parameters,
the digital signal processor being connected to the power
amplifier

5. An amplifier comprising:
a power amplifier; and
a digital signal processor capable of receiving and storing
at least one of an algorithm which defines at least one
signal processing function and signal processing func-
tion parameters, the digital signal processor being
connected to the power amplifier;

13. An amplifier comprising:
a power amplifier; and
a digital signal processor capable of receiving and storing
at least one of an algorithm which defines at least one
signal processing function and signal processing func-
tion parameters, the digital signal processor being
connected to the power amplifier;

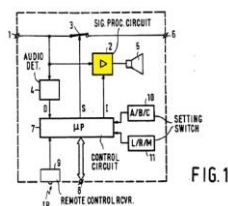
"Amplifier housing" not deemed limitation effecting patentability

- Signal processing circuit 2 merely a functional block in a diagram
- Represents both amplification & signal processing functions
- Not a physical unit with a housing



Examiner: The "two arrangements are functionally equivalent"

- Saying it is irrelevant if amplification function and controlled signal processor in same or different housing
- Housing functionality irrelevant



(c) Discussion

The Federal Circuit has explained that "[l]ike the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent. * * * Furthermore, like the specification, the prosecution history was created by the patentee in attempting to explain and

obtain the patent. Yet because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes. * * * Nonetheless, the prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be.” *Phillips*, 415 F.3d at 1317.

The Federal Circuit has also explained that “the specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal. * * *. The standards for finding lexicography and disavowal are exacting. To act as its own lexicographer, a patentee must ‘clearly set forth a definition of the disputed claim term,’ and ‘clearly express an intent to define the term.’ * * * Similarly, disavowal requires that ‘the specification [or prosecution history] make[] clear that the invention does not include a particular feature.’ ” *GE Lighting Solutions, LLC v. AgiLight, Inc.*, 780 F.3d 1304, 1309 (Fed. Cir. 2014).

The foregoing discussion of the prosecution history fails to present any clear statement that the “housing limitation” must be “read into” the claim. As the foregoing prosecution history reveals, the “housing limitation” was not viewed as a limitation that itself defined over the prior art. There was nothing improper in ultimately deleting that limitation when the remaining limitations defined over the prior art. The examiner’s statement objecting to dependent claims and stating that the claims would be allowable if rewritten as an independent claim is a “form paragraph” examiners are instructed to use. MPEP § 608.01(n), Form Paragraph ¶ 7.43. That does not compel an applicant to do so. An applicant, as the applicant did here, may review the claims, identify the limitations that define over the prior art (and those that do not), and then present a claim including what the examiner has indicated is allowable subject matter. With respect to the applicant’s statements to the examiner, those do not rise to the level of requiring a “housing limitation” be read into the claims. The amendment plainly showed what limitations from claim 1 were added to dependent claim 4, and the examiner then had the opportunity to reexam the amended claim. If the examiner had not believed that the amended claim was not patentable over the prior art, then the examiner could have refused to enter the amendment. However, here, the examiner found that the amended claim, without the housing limitation, defined patentably over the prior art.

Lastly, *Edwards*, *Alloc*, and *Seachange* do not compel a different conclusion. In those cases, there had been reliance on the subject limitation. Here, the “housing limitation” was not a limitation that defined patentably over the prior art.

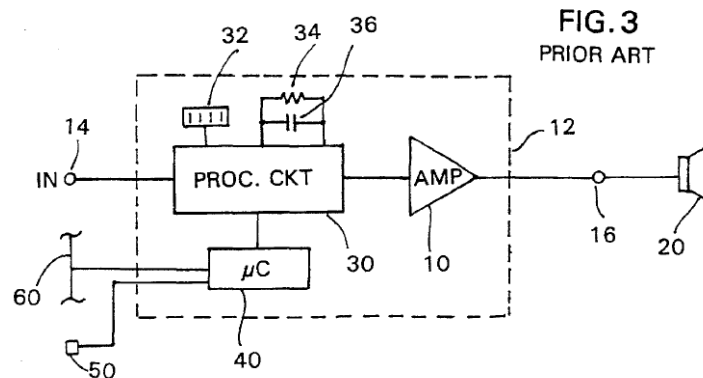
(6) '544 Patent Specification and Claims

(a) Crest's Opening Brief

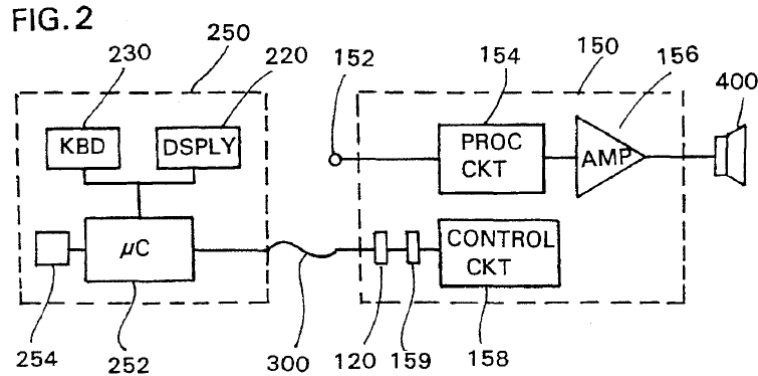
Crest also relies on the specification of the '544 patent. Crest urges that the specification of the '544 patent explains that an amplifier “drives [a] loudspeaker.” *Id.* What the specification says at the location Crest cites is that:

A conventional amplifier 10 is shown in FIG. 3. The amplifier is mounted within an amplifier housing 12 and includes an input port 14 and an output port 16. A load such as a loudspeaker 20 is connected to the output port 16 so that the amplifier 10 drives the loudspeaker 20. A signal processing circuit 30 of the amplifier 10 is located within the amplifier housing 12. The signal processing circuit 30 includes a plurality of signal processing circuit elements which may include a plurality of switches 32, resistors 34 and capacitors 36 and other suitable signal modifying devices (not shown). The signal processing function and function parameters of the amplifier 10 are determined by the plurality of signal processing circuit elements.

'544 patent, col. 1, lines 49-61, referring to Fig. 3:

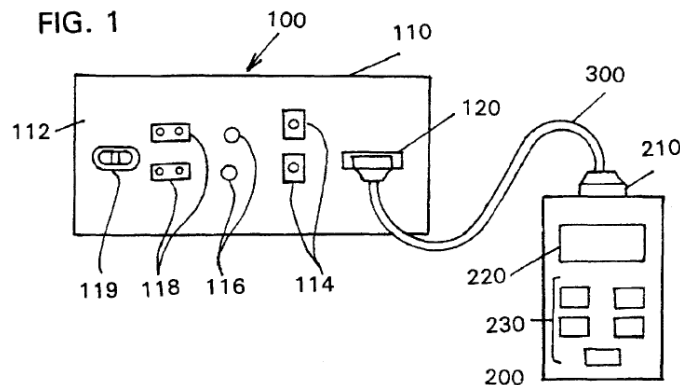


Crest then points to Fig. 2 of the '544 patent:



as illustrating an “amplifier circuit” 150 that drives loudspeaker 400. Crest’s Op. Brief [Dkt. 191] at 13.

Fig. 1 of the '544 patent, illustrates:



The specification of the '544 patent explains *vis-à-vis* Fig. 1:

An amplifier 100 according to one aspect of a preferred embodiment of the invention is shown in FIG. 1. The amplifier includes an amplifier housing 110 which includes a control panel 112 having a plurality of control elements and ports. Input ports 114 for receiving connectors from one or more input devices are provided on the control panel 112. Also, a plurality of control knobs 116 for controlling gain, volume, an equalizer circuit, a level threshold, etc. are provided on the control panel 112 as is conventional. A plurality of output ports 118 and an AC power connector 119 are also provided on the control panel 112.

The control panel 112 also includes a programming port 120 for receiving a connector from the portable amplifier programmer described below. This programming port may also be connected to a data bus of a network of interconnected amplifiers. The network

is connected to a computer or other similar device and control information can be input from the computer to the amplifier via the programming port 120.

A preferred embodiment of a portable amplifier programmer 200 is also shown in FIG. 1. The programmer 200 is removably connectable to the amplifier 100 through a connector 300 which is connected to the programming port 120 of the amplifier 100 and an output port 210 of the portable programmer 200. The programmer 200 preferably includes a display screen 220 for displaying parameter values. Desired signal modifications and other suitable information. The portable programmer 200 also includes an input device such as keypad 230 for entering parameter and signal modification information, signal processing function programs and program data.

The portable programmer 200 allows a user to modify parameters of amplifier circuit elements inside the amplifier, modify signal processing functions set by the signal processing circuit, read back previously set parameter values and store a group of input parameter values for future use as will be explained in greater detail below.

'544 patent, col. 5, line 44-col. 6, line 14.

The specification then describes Fig. 2, in part, as:

FIG. 2 shows an amplifier circuit 150 of the amplifier 100 shown in FIG. 1 and an operational circuit 250 of the portable programmer 200. The amplifier circuit 150 of the amplifier 100 includes an input interface 152 connected to the input port 116. The input interface 152 provides audio signals from an input device (not shown) such as a musical instrument, public address system, sound system, etc. to a signal processing circuit 154 which is connected to a power amplifier 156. The amplifier circuit 150 is connected to a load 400 such as a loudspeaker.

The signal processing circuit 154 and power amplifier 156 are preferably located within the amplifier housing 110. The amplifier housing 110 also has a control circuit 158 located therein. The control circuit is preferably connected to the programming port 120 and the signal processing circuit 154.

The amplifier circuit 150 may be provided with a memory or storage device 159 for storing input command signals therein. As soon as the command signals have been input from the programmer 200 through the connector 300 to the programming port 120, the programmer 200 can be disconnected from the amplifier 100 because the input commands are stored in the storage device 159. Alternatively, the storage device can be provided in the signal processing circuit 154.

'544 patent, col. 6, lines 15-40.

Crest urges that “Figure 2 of the ‘544 patent does not depict or suggest any housing because a housing is irrelevant to the function and purpose of the amplifier. Thus, Figure 2 of the ‘544 patent underscores the notion that Defendant’s housing limitation is not proper.” Crest’s Op. Brief [Dkt. 191] at 13.

(b) QSC's Response

QSC acknowledges that its position *vis-à-vis* the '544 patent has changed: "QSC's position had been that the Court should construe the 'amplifier comprising' term the same way in both the '542 and '544 patents. But QSC agrees with Crest that the term, as it appears in the '544 patent, has a different meaning, and thus should not be construed the same way as in the '542 patent. The general rule of claim construction is that similar terms in related patents should be construed similarly. But that rule must yield when the circumstances so require. The circumstances require it here." QSC's Resp. Brief [Dkt. 192] at 19-20.

In particular, QSC relies on the difference between the file prosecution histories: "As described above, the '542 patent file history leaves no reasonable doubt that the inventor represented to the examiner that his invention was a DSP in the same housing as a power amplifier. That file history—which compels QSC's construction for the '542 patent—is not present in the '544 patent." QSC's Resp. Brief [Dkt. 192] at 20.

Second, QSC agrees with Crest that dependent claim 6 in the '544 patent indicates that parent claim 1 should not be construed as including a "housing" limitation: "[T]he '544 patent's claims demonstrate that while the inventor viewed his invention in the '542 patent as an integrated DSP, he did not view that to be the case with the '544 patent. For instance, claim 6 of the '544 patent recites 'the amplifier of claim 1, further comprising an amplifier housing, the signal processing circuit and power amplifier being located in said amplifier housing.' Thus, the inventor did not believe that independent claim 1 of the '544 patent required the DSP to be in the same housing as the power amplifier. Yet, notably, this similar dependent claim *is not* found in the '542 patent, suggesting the opposite conclusion." QSC's Resp. Brief [Dkt. 192] at 20-21.

QSC also urges that the description of the '542 patent's "configuration" in the '544 patent supports its argument: "Per the '544 patent's specification: in the '542 patent, "*the* amplifier" has a 'digital signal processor,' and one of the benefits of this configuration is that '[i]f such a digital signal processor is provided *in the amplifier*, both signal processing functions and function parameters can be changed by inputting control information from the portable programmer to *the amplifier*.' Thus, the '544 patent describes the '542 patent's configuration as a DSP located in an integrated amplifier." QSC's Resp. Brief [Dkt. 192] at 21, quoting '544 patent, col. 3, lines 9-20 (emphasis by QSC).

Accordingly, QSC urges that “[b]ecause, as to this issue, the intrinsic evidence is meaningfully different between the ’542 and ’544 patents, the Court should construe the ’542 patent’s independent claims as requiring the DSP to be located within the same housing as the power amplifier, but should not so construe claim 1 of the ’544 patent.” *Id.*

(c) Crest’s Reply

Crest replies that “QSC’s concessions highlight the flaws of its faulty arguments with respect to the exact same term in the ’542 patent. For example, QSC concedes that dependent claim 6 of the ’544 patent, which expressly recites the housing limitation, shows that ‘the inventor did not believe that independent claim 1 of the ’544 patent required the DSP to be in the same housing as the power amplifier.’ * * * But the ’542 patent incorporates by reference the entire disclosure of the ’544 patent, including claim 6 which was present in the originally filed disclosure of the application for the ’544 patent. * * * Furthermore, QSC, in its brief in support of consolidating the ’542 and ’544 litigations, acknowledged how closely interrelated the ’542 and ’543 patents are: “Both patents are directed to amplifiers, and more specifically to the use of digital signal processors in amplifiers.” Dkt. 14, p. 4. Consequently, QSC’s own explanation as to why ‘an amplifier comprising’ in the claims of the ’544 patent does not incorporate a housing limitation is equally applicable to the ’542 patent.” Crest’s Reply [Dkt. 193] at 9-10.

With respect to QSC’s argument that the lack of a dependent claim in the ’542 patent similar to dependent claim 6 of the ’544 patent supports QSC’s argument that the claims of the ’542 patent should be construed as including a “housing” limitation, Crest urges: “In other words, QSC is arguing that a dependent claim present in the ’544 patent – a claim that is narrower than limitations *removed* from the ’542 patent’s claims during prosecution – should be grafted into the claim preamble of the ’542 patent because there is no corresponding dependent claim in the ’542 patent. Yet, and most notably, QSC is unable to cite to a single legal authority in support of such a radical endeavor. QSC’s argument defies logic and should not be accepted.” *Id.* at 10.

(d) Discussion

Plainly, the preamble of claim 1 of the ’544 patent cannot be construed as implicitly including a “housing limitation,” as QSC now concedes. But, as noted above, neither the specification nor prosecution history of the ’542 patent requires construing the preamble of claim 1 of the ’542 patent as including a “housing limitation.” QSC has also pointed to nothing in the ’544 patent that would

require doing so. The portions QSC points to do not rise to the level required to import a “housing limitation” into claim 1 of the ’542 patent.

(7) Extrinsic Evidence

(a) Crest’s Opening Brief

Crest relies on testimony from William C. Pirkle, its technical expert, that “there are commercially available amplifiers such as, for example, the ‘Ashly NE (Network Enabled) and Yamaha PC1-N amplifier systems in which network amplifier control and signal processing functions are placed in separate units to facilitate installations of these systems in large venues, houses of worship and theme parks.’ ” Crest’s Op. Brief [Dkt. 191] at 16.

Crest also points to Mr. Pirkle’s testimony that “the distribution of functional components, such as amplifiers, in separate housings (or chassis, plural) was, and still is, fairly commonplace in professional audio systems.” *Id.*

Crest urges that “[b]ecause expert testimony further demonstrates that ‘a person of ordinary skill in the art would not understand the term “an amplifier comprising” as meaning “a device for amplifying audio signals that includes a digital signal processor and a power amplifier in the same housing,” ’ ” it’s proposed construction should be adopted.

(b) QSC’s Response

QSC says that Mr. Pirkle’s declaration is “little more than regurgitation of Crest’s litigation position backed by context-free common dictionary definitions.” QSC’s Resp. Brief [Dkt. 192] at 25.

QSC urges that “[t]his is not helpful expert testimony, and it would be error to rely on it. As the Federal Circuit recently pointed out, expert testimony is entitled to no weight when it is ‘conclusory and incomplete,’ ‘lack[s] any substantive explanation tied to the intrinsic record,’ and ‘appear[s] to conflict with the plain language of the written description.’ ” *Id.* at 25-26, quoting *SkinMedica, Inc. v. Histogen, Inc.*, 727 F.3d 1187, 1209 (Fed. Cir. 2013) (citations omitted).

(c) Discussion

The extrinsic evidence has been considered, but is considered to simply be consistent with the foregoing conclusions.

5. Recommendation

For the foregoing reasons, the master recommends that the Court conclude that (1) the preamble of claims 1, 5 and 13 of the '542 patent (as well as the preamble of claim 1 of the '544 patent) is not limiting, and (2) neither the preamble, nor any other portion of claim 1 of the '542 patent requires the construction that “a digital signal processor and a power amplifier in the same housing.”

Crest's proposed construction “an audio system including electronic devices that amplify low-power audio signals to a level suitable for driving loudspeakers” and the remainder of QSC's proposed construction “a device for amplifying audio signals” are significantly different. Other than the two conclusions above, there does not appear to be any reason for further construing the preambles of the claims.

C. “signal processing function”

The parties' proposed the following contested constructions:

Claim Nos.	Crest's Proposed Construction	QSC's Proposed Construction
'542 patent, cls. 1, 5, 11-13 '544 patent, cls. 1, 20, and 23	“a set of instructions for processing audio signals”	Plain and ordinary meaning – no construction is necessary
A/JCCS [Dkt. 184] at 4, Crest's Op. Brief [Dkt. 191] at 16, QSC's Resp. Brief [Dkt. 192] at 26		

1. The Parties' Arguments

a) Crest's Opening Brief

Crest urges that “signal processing function” should be broken into “function” and “signal processing.” The term “function,” Crest says, would be understood in the context of the '542 and '544 patents as a “a set of instructions for the ‘digital signal processor’ also recited in the claims.” Crest's Op. Brief [Dkt. 191] at 17. Crest urges that “signal processing” modifies the word “function” and in the context of the claims, signal processing is audio signal processing. Thus, says Crest, “the plain and ordinary meaning of the term ‘signal processing function’ is ‘a set of instructions for processing audio signals.’ ” *Id.*

Crest urges that the specifications of the '542 and '544 patents support its proposed construction. Crest points to the '542 patent describing in various embodiments a “microprocessor 250 may transfer *programs in a form executable by the digital signal processor 250 or may transfer coefficients and data to be used by the program stored in the digital signal processor 250 in executing the signal processing function or functions.*” Crest’s Op. Brief [Dkt. 191] at 17-18, quoting '542 patent, col. 6, lines 58-62 (emphasis by Crest). Crest contends that a person of ordinary skill in the art would understand that the description of a DSP “executing the signal processing function or functions” indicates “that the signal processing function is a set of instructions for the digital signal processor because it is known that processors ‘execute’ sets of instructions.” *Id.* at 18.

Crest also points to the '542 patent specification explaining that the amplifier can receive “*audio signal processing* programs and program data for defining the signal processing function and parameters of the amplifier 100.” *Id.*, quoting '542 patent, col. 6, lines 49-52. Thus, says Crest, the '542 patent specification “confirms that the term ‘signal processing function’ means ‘a set of instructions for processing audio signals.’ ” *Id.*

In the '544 patent, Crest points to the description in the specification stating that “[i]f a digital signal processor is provided in the amplifier, programs and program data for defining a plurality of signal processing functions and function parameters may be entered into the portable programmer and downloaded from the portable programmer to the amplifier.” '544 patent, col. 3, lines 17-20. Crest urges that “[b]ecause the signal processing functions are described as being ‘defin[ed]’ by programs, the specification of the '544 patent also confirms that the claim term ‘signal processing function’ means ‘a set of instructions for processing audio signals’ to one of ordinary skill in the art.” Crest’s Op. Brief [Dkt. 191] at 18.

Crest also relies on various dictionary definitions. Crest points to (1) the COMPUTER DESKTOP ENCYCLOPEDIA, 2d ed., (1999) defining “function” as “a self-contained software routine that performs a job,” (2) the MERRIAM WEBSTER’S COLLEGIATE DICTIONARY, 11th ed. (2012) defining a “function” as a “computer subroutine,” and (3) the MICROSOFT COMPUTER DICTIONARY, 5th ed. (2002) defining “function” to mean “[t]he purpose of, or the action carried out by, a program or routine” and “[a] general term for a subroutine.”

Crest urges that “[a]s would be appreciated by a person of ordinary skill, computer programs, routines, and subroutines all have at least one thing in common: they all are sets of instructions for a

processor. Thus, extrinsic evidence further confirms that the claim term ‘signal processing function’ means ‘a set of instructions for processing audio signals’ to one of ordinary skill in the art.” Crest’s Op. Brief [Dkt. 191] at 19.

b) QSC’s Responsive Brief

QSC contends that “signal processing function” does not require construction because “the plain and ordinary meaning of ‘signal processing function’ is clear in the context of the ’542 and ’544 patents, and the terms are easily understood.” QSC’s Resp. Brief [Dkt. 192] at 26.

QSC urges that Crest’s proposed construction is directed to “obfuscation.” QSC urges that the specification and claims show that Crest’s proposed construction is wrong.

First, QSC contends that the ’542 patent specification defines “signal processing functions” as broader than instructions for processing audio signals. QSC points to the specification’s description of signal processing functions as including “a crossover function in which audio-frequency input to the signal processing circuit is divided into two or more bands of frequencies.” QSC’s Resp. Brief [Dkt. 192] at quoting ’542 patent, col. 1, lines 24-26. QSC also points to other signal processing functions described in the specification as including “a band splitting or eliminating function, a volume control function, an equalizing function, a frequency division function, an equalizing function, a frequency division function, a limiter or compression function, a microphone or line level mixer, an ambient sense level control function and any other suitable function.” *Id.* quoting ’542 patent, col. 1, lines 31-37.

QSC urges that “[t]he specification further specifically provides that these signal-processing functions need not be a ‘set of instructions,’ but rather, can include digital and analog circuitry. In describing the ‘signal processing circuit,’ the specification states that the circuit ‘includes various analog and/or digital components such as resistors, capacitors, switches and other electronic devices that *together define a signal processing function.*’ ” *Id.* at 27, quoting ’542 patent, col. 1, lines 21-24 (emphasis by QSC). Thus, QSC argues, “the ’542 patent expressly defines ‘signal processing function’ as a type of audio processing, not merely a set of instructions for audio processing, as Crest proposes.” *Id.*

QSC also points to the claims saying that Crest’s proposed construction would render claim terms redundant. QSC notes that the claims require that an “algorithm” define the signal processing function, and an “algorithm” is a set of instructions. *Id.* QSC, pointing to claim 1 calling for “an

algorithm which defines at least one signal processing function and signal processing function parameters,” urges that Crest’s construction would render “algorithm” redundant. *Id.*

QSC further urges that Crest’s citations to the specification actually support a distinction between (1) “program and program data” and “algorithms” that define signal processing functions and (2) “signal processing functions.” QSC points to Crest’s reliance on the specification’s description of “programs and program data for defining the signal processing functions and parameters of the amplifier 100,” and notes that software programs are understood to constitute a “set of instructions.” QSC contends that means that “programs” and “signal processing functions” are different.

With respect to Crest’s reliance on dictionary definitions, QSC contends that the specification is that a “signal processing function” can be implemented in hardware alone. QSC’s Resp. Brief [Dkt. 192] at 28-29.

c) Crest’s Reply

Crest contends that QSC’s contention that a “signal processing function” can include digital and analog circuitry is refuted by the clear language of the claims. Crest points to claim 1 of the ’544 patent that calls for “a digital signal processor capable of receiving at least one of a signal processing function.” Crest urges that “it would make no sense to say that a digital signal processor is capable of receiving digital and analog circuitry because it is impossible for a digital signal processor to receive circuitry (*i.e.*, physical components). So, QSC’s nonsensical argument must fail.” Crest’s Reply [Dkt. 193] at 11.

Crest also contends that its proposed construction does not render claim terms redundant. In pointing to claim 1 of the ’542 patent, Crest urges that QSC omitted a portion of the Crest’s proposed construction. Crest urges that when its entire construction is used, claim 1 of the ’542 patent would read: “an algorithm which defines [a set of instructions for processing audio signals],” which does not render “algorithm” redundant as QSC asserted.

d) Claim Construction Hearing Presentation Slides

Crest presented the following slides at the claim construction hearing illustrating its argument:

Crest's Presentation Slides

Claim phrase:
"signal processing function"

Crest Audio's Proposed Interpretation	QSC's Proposed Interpretation
"a set of instructions for processing audio signals"	None provided.

Conventional Amplifiers

BACKGROUND OF THE ART

Conventional amplifiers, such as the amplifier 10 shown in FIG. 3, typically have a signal path including an input port 12, a signal processing circuit 14, a power amplifier 16 and an output port 18 connected to a load such as a loudspeaker 20. The signal processing circuit 14 and power amplifier 16 form an integral unit as seen in FIG. 3. The signal processing circuit 14 includes various analog and/or digital components such as resistors, capacitors, switches and other electronic devices that together define a signal processing function.

Amplifiers with DSPs

SUMMARY OF THE INVENTION

There exists a need for an improved amplifier signal processing circuit capable of modifying both signal processing functions and signal processing function parameters.

A preferred embodiment of the present invention provides an amplifier having a digital signal processor for selectively programming signal processing functions and signal processing function parameters. The digital signal processor is preferably provided in a module which includes a plurality of input ports for receiving input control signals and/or input audio signals from various input devices for changing at least one of the signal processing functions and the signal processing function parameters.

In an alternative embodiment, a single input port can be used to transmit both audio signals and control signals over the same line. Thus, digital or analog audio signals and digital control signals for downloading to the digital signal processor a program defining a signal processing function and parameters can be received through a single input port provided on the digital signal processor.

The specifications describe signal processing functions in two contexts

- **Conventional amplifiers** in which signal processing functions are defined by the physical circuit design
- **Amplifiers with DSPs** in which signal processing functions are defined by DSP programs

Conventional Amplifiers

However, with this amplifier 10, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed. Although the user can change the signal processing function parameters as described above, it is often necessary or desirable to change the signal processing function or even combine several different signal processing functions in the signal processing circuit. This is not possible with conventional amplifiers.

Amplifiers with DSPs

The digital signal processor preferably includes a non-volatile storage device or memory for storing the programs and program data that define the signal processing functions and function parameters. The non-volatility of the storage device allows the signal processing functions and parameters to be unaffected by connecting and disconnecting a power source to the amplifier.

Crest's Presentation Slides

Claim phrase:
"signal processing function"

1. An amplifier comprising:
 - a power amplifier; and
 - a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

QSC Abandoned its Original Argument

No construction of this term is necessary, as the plain and ordinary meaning of "signal processing function" is clear in the context of the asserted claims. QSC objects to Crest's proposed construction because it blurs the distinctions between "signal processing function" and "signal processing parameter" stated in certain claims, described in the specification, and affirmed to the Examiner during prosecution of the '544 patent.

Claim phrase:
"signal processing function"

1. An amplifier comprising:
 - an input port for receiving an input signal;
 - a signal processing circuit comprising a digital signal processor capable of receiving at least one of a signal processing function and a signal processing function parameter, wherein the signal processing circuit receives the input signal from the input port and modifies the input signal;
 - a power amplifier for amplifying the modified input signal received from the signal processing circuit and outputting an amplified signal to an output device;
 - an external programmer; and
 - a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

Arguments Raised in QSC's Brief

Says the specification of the '542 Patent provides that a signal processing function can include digital and analog circuitry

- *But all claims require a DSP capable of receiving (1) an algorithm defining a signal processing function or (2) a signal processing function*
- *Makes no sense to say that a DSP receives physical circuitry*

Arguments Raised in QSC's Brief

Says Crest's construction renders "an algorithm" redundant

1. An amplifier comprising:
 - a power amplifier; and
 - a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,
- the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

QSC presented the following slides during the claim construction hearing:

QSC's Presentation Slides

"signal processing function"

QSC's Proposed Construction	Crest's Proposed Construction
Plain and ordinary meaning—no construction necessary	"a set of instructions for processing audio signals"

Signal Processing Functions



Signal Processing Parameters

SUMMARY OF THE INVENTION

There exists a need for an improved amplifier signal processing circuit capable of modifying both signal processing functions and signal processing function parameters. A preferred embodiment of the present invention provides an amplifier having a digital signal processor for selectively programming signal processing functions and signal processing function parameters. The digital signal processor is preferably provided in a module which includes a plurality of input ports for receiving input control signals and/or input audio signals from various input devices for changing at least one of the signal processing functions and the signal processing function parameters.

542 patent at 1:21-34

What is claimed is:

1. An amplifier comprising:
a power amplifier; and
a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters.
the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

542 patent at Claim 1

A circuit can define a signal processing function

Using the example of a crossover function discussed above, the signal processing circuit 14 defines both the signal processing function (crossover), as well as, signal processing function parameters, such as a crossover frequency and amplitude. More specifically, the various signal processing circuit elements define the exact amplitude and frequency that determines how to divide the audio-frequency input into the high frequency band and the low frequency band.

542 patent at 1:37-45

A program can define a signal processing function

Digital signal processor 250 is programmable and performs a signal processing operation for amplifying or modifying the characteristics of an input audio signal to produce a modified output signal. The digital signal processor 250 is capable of receiving and storing an algorithm or program that defines a signal processing function and/or corresponding function parameters. In addition, the digital signal processor 250 is adapted to receive control signals for modifying the signal processing function and associated

542 patent at 6:1-9

Digital and analog components can define a signal processing function

Conventional amplifiers, such as the amplifier 10 shown in FIG. 3, typically have a signal path including an input port 12, a signal processing circuit 14, a power amplifier 16 and an output port 18 connected to a load such as a loudspeaker 20. The signal processing circuit 14 and power amplifier 16 form an integral unit as seen in FIG. 3. The signal processing circuit 14 includes various analog and/or digital components such as resistors, capacitors, switches and other electronic devices that together define a signal processing function.

542 patent at 1:15-24

An algorithm is a set of instructions

QSC also argues that Crest's construction renders claim terms in the '542 patent redundant because "the claims already require that an 'algorithm' define the signal processing function, and an algorithm is, of course, a set of instructions." Dkt. 192, p. 27. But QSC omits the remainder of the Crest's construction "a set of instructions for processing audio signals" when making this argument. Substituting the entire construction of the term in claim 1 of the '542 patent would read: "an algorithm which defines [a set of instructions for processing audio signals]." As shown when the entire construction of the term is read into the claim, Crest's construction does not render claim terms redundant.

Crest Reply at 11

An algorithm is a set of instructions

**"[a set of instructions] which defines
[a set of instructions for processing audio signals]"**

2. Discussion

At the outset, QSC's proposal that "signal processing function" should be given its "plain and ordinary meaning" and "no construction is necessary" is untenable in light of the disagreement of the parties. See *O2 Micro International Ltd. v. Beyond Innovation Technology Co., Ltd.*, 521 F.3d 1351, 1360 (Fed. Cir. 2008) ("When the parties raise an actual dispute regarding the proper scope of these claims, the court, not the jury, must resolve that dispute.").

Second, while QSC contends that Crest's proposed construction is wrong for several reasons, QSC has not proposed an alternative construction. That makes construction more difficult.

Beginning as always with the claim language, claim 1 of the '542 patent calls for:

1. An amplifier comprising:

a power amplifier; and

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

The "digital signal processor" limitation defines the "digital signal processor" as being one "capable of receiving and storing at least one of an algorithm." The limitation then says that the "algorithm" "defines at least one signal processing function and signal processing function parameters."

QSC urges that "an algorithm is, of course, a set of instructions." QSC's Resp. Brief [Dkt. 192] at 27. Crest does not disagree, but, as noted above, disagrees that its proposed construction renders "algorithm" redundant.

The specification of the '542 patent uses the term "algorithm" eleven times – eight times in the claims and three times in the specification. The specification first uses "algorithm" in the context of "[f]urther, adaptive algorithms and linear-phase all-zero filters can be implemented." '542 patent, col. 4, lines 18-21. That is not much help.

The second time “algorithm” is used is in describing Fig. 2:

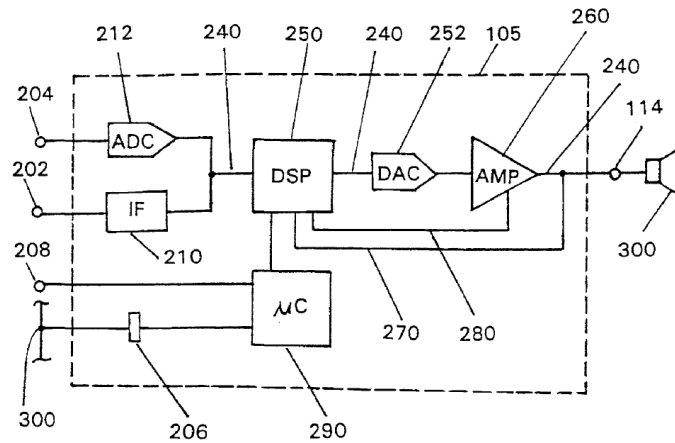


FIG. 2

Here, the specification explains that:

Digital signal processor 250 is programmable and performs a signal processing operation for amplifying or modifying the characteristics of an input audio signal to produce a modified output signal. The digital signal processor 250 is capable of receiving and storing an algorithm or program that defines a signal processing function and/or corresponding function parameters.

'542 patent, col. 6, lines 1-7 (emphasis added). Thus, one knows that DSP 250 is “programmable” and “algorithm” is equated to “program.” Additionally, one knows that the “algorithm or program” “defines” “a signal processing function and/or corresponding function parameters.”

The third time “algorithm” is used in the specification of the '542 patent is in the same paragraph of the specification, and in context says:

More specifically, several different signal processing functions can be combined and modified by simply inputting appropriate control signals to the digital signal processor 250. This allows the amplifier to implement such advantageous features as distributed system performance including array steering and acoustic zone control, as well as, using adaptive algorithms and linear-phase, all-zero filters and amplifier power dissipation controls.

'542 patent, col. 6, lines 12-19. That, of course, offers little assistance.

At this stage, it is instructive to step back a moment and consider, solely by way of background and only in general terms, what a “digital signal processor” or DSP actually is. Neither party has

requested that the term “digital signal processor” requires construction. Accordingly, nothing herein should be taken, or understood, as commenting on “digital signal processor” as that term is used in the patents-in-suit. Or, in any way, as a “construction” of that term. The discussion here is necessarily general, and intended solely to provide an overall, high-level view.

The following is a collection of websites that discuss DSPs and, in general terms, what they are. None of these websites is deemed “authoritative” in the sense of sufficient for finding facts or basing a legal conclusion on what they say. These websites are noted here solely “to better understand the underlying technology,” *Phillips*, 415 F.3d at 1318, and have not been relied upon in making any claim construction decisions.

One source that discusses DSPs is the website for Maxim Integrated, Inc., an electronics manufacturer, which explains, in a glossary of “EE Terms,” that “[a] Digital Signal Processor, or DSP, is a special-purpose digital circuit that acts on digitized signals, such as audio. DSP circuits can replace traditional analog functions, such as filtering and more complex functions that are difficult to accomplish in the analog domain.” <https://www.maximintegrated.com/en/glossary/definitions.mvp/term/Digital%20Signal%20Processor/gpk/1151>. Another source explains that “[d]igital signal processing (DSP) is the process of analyzing and modifying a signal to optimize or improve its efficiency or performance. It involves applying various mathematical and computational algorithms to analog and digital signals to produce a signal that's of higher quality than the original signal,” and a “DSP is primarily used to detect errors, and to filter and compress analog signals in transit. It is a type of signal processing performed through a digital signal processor or a similarly capable device that can execute DSP specific processing algorithms. Typically, DSP first converts an analog signal into a digital signal and then applies signal processing techniques and algorithms. For example, when performed on audio signals, DSP helps reduce noise and distortion. Some of the applications of DSP include audio signal processing, digital image processing, speech recognition, biomedicine and more.” <https://www.techopedia.com/definition/2360/digital-signal-processing-dsp>. Another source, the website for Future Electronics, an electronic component distributor, explains that “[a] Digital Signal Processor, or DSP, is a specialized microprocessor that has an architecture which is optimized for the fast operational needs of digital signal processing. A Digital Signal Processor (DSP) can process data in real time, making it ideal for applications that can't tolerate delays. Digital signal processors take a digital signal and process it to improve the signal into clearer sound, faster data or sharper images.

Digital Signal Processors use video, voice, audio, temperature or position signals that have been digitized and mathematically manipulate them. A digital signal processor is designed to perform these mathematical functions rapidly. The signals are processed so the information contained in them can be displayed or converted to another type of signal.” <http://www.futureelectronics.com/en/Microprocessors/digital-signal-processors.aspx>. Another source, Steven W. Smith, PhD, “The Scientist and Engineer’s Guide to Digital Signal Processing,” chpt. 28, explains that “Digital Signal Processing is carried out by mathematical operations. In comparison, word processing and similar programs merely rearrange stored data. This means that computers designed for business and other general applications are not optimized for algorithms such as digital filtering and Fourier analysis. Digital Signal Processors are microprocessors specifically designed to handle Digital Signal Processing tasks. These devices have seen tremendous growth in the last decade, finding use in everything from cellular telephones to advanced scientific instruments. In fact, hardware engineers use ‘DSP’ to mean Digital Signal Processor, just as algorithm developers use ‘DSP’ to mean Digital Signal Processing.” <http://www.dspguide.com/ch28.htm>. A website for Analog Devices, Inc., an electronics manufacturer, explains that “Digital Signal Processors (DSP) take real-world signals like voice, audio, video, temperature, pressure, or position that have been digitized and then mathematically manipulate them. A DSP is designed for performing mathematical functions like ‘add’, ‘subtract’, ‘multiply’ and ‘divide’ very quickly. Signals need to be processed so that the information that they contain can be displayed, analyzed, or converted to another type of signal that may be of use. In the real-world, analog products detect signals such as sound, light, temperature or pressure and manipulate them. Converters such as an Analog-to-Digital converter then take the real-world signal and turn it into the digital format of 1’s and 0’s. From here, the DSP takes over by capturing the digitized information and processing it. It then feeds the digitized information back for use in the real world. It does this in one of two ways, either digitally or in an analog format by going through a Digital-to-Analog converter. All of this occurs at very high speeds.” (paragraphing deleted) <http://www.analog.com/en/design-center/landing-pages/001/beginners-guide-to-dsp.html>.

Here, once again, the parties do not dispute what the term “digital signal processor” means. Thus, when claim 1 of the ’542 patent, for example, calls for “a digital signal processor capable of receiving and storing” *etc.*, the parties do not dispute the scope or meaning of “digital signal processor.”

Returning to the aforementioned portion of the specification explaining that:

Digital signal processor 250 is programmable and performs a signal processing operation for amplifying or modifying the characteristics of an input audio signal to produce a modified output signal. The digital signal processor 250 is capable of receiving and storing an algorithm or program that defines a signal processing function and/or corresponding function parameters.

'542 patent, col. 6, lines 1-7 (emphasis added), the specification first describes DSP 250 as being “programmable.” The parties have not disputed the term “programmable,” which, of course, simply means capable of being programmed. Then, in the next sentence, the specification explains that the DSP is “capable of receiving and storing” (a disputed phrase addressed below) an “algorithm” or “program.”

Again, the limitation under discussion in claim 1 of the '542 patent calls for:

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

Thus, per the specification, “algorithm” may be understood as being interchangeable with “program.” That “algorithm” or “program” is said to “define[]” at least one “signal processing function * * *.”

Although “function” has several colloquial understandings, plainly “function” is being used in the context of “program” and a DSP, per the specification, that is “programmable.”

Crest notes that, in the field of computers or programmable devices, “function” carries the meaning of a software routine or subroutine. Namely, Crest points to (1) the Computer Desktop Encyclopedia, 2d ed., (1999) defining “function” as “a self-contained software routine that performs a job,” (2) the Merriam Webster’s Collegiate Dictionary, 11th ed. (2012) defining a “function” as a “computer subroutine,” and (3) the Microsoft Computer Dictionary, 5th ed. (2002) defining “function” to mean “[t]he purpose of, or the action carried out by, a program or routine” and “[a] general term for a subroutine.”

Another source explains that “[i]n computer programming, algorithms are often created as functions. These functions serve as small programs that can be referenced by a larger program. For example, an image viewing application may include a library of functions that each use a custom algorithm to render different image file formats. An image editing program may contain algorithms designed to process image data. Examples of image processing algorithms include cropping, resizing,

sharpening, blurring, red-eye reduction, and color enhancement.” The Tech Terms Computer Dictionary, <https://techterms.com/definition/algorithm>. That same source further explains that “[c]omputer functions are similar to math functions in that they may reference parameters, which are passed, or input into the function.” <https://techterms.com/definition/function>.

A further source similarly explains that a function is “[i]n programming, a named section of a program that performs a specific task. In this sense, a function is a type of procedure or routine. Some programming languages make a distinction between a function, which returns a value, and a procedure, which performs some operation but does not return a value. Most programming languages come with a prewritten set of functions that are kept in a library. You can also write your own functions to perform specialized tasks.” <http://www.webopedia.com/TERM/F/function.html>.

Similarly, a further source explains that “[i]n C language and other programming, a function is a named procedure that performs a distinct service. The language statement that requests the function is called a function call. Programming languages usually come with a compiler and a set of ‘canned’ functions that a programmer can specify by writing language statements. These provided functions are sometimes referred to as library routines. Some functions are self-sufficient and can return results to the requesting program without help. Other functions need to make requests of the operating system in order to perform their work.” <http://whatis.techtarget.com/definition/function>.

The website for the University of Utah, School of Computing similarly explains that “[f]unctions are ‘self contained’ modules of code that accomplish a specific task. Functions usually ‘take in’ data, process it, and ‘return’ a result. Once a function is written, it can be used over and over and over again. Functions can be ‘called’ from the inside of other functions. <http://www.cs.utah.edu/~germain/PPS/Topics/functions.html>.

Also, anyone who is familiar with the popular spreadsheet program EXCEL are aware that “functions” (f_x), namely preset formulas for performing various mathematical, statistical and logical operations, such as SUM, AVERAGE, *etc.*, may be “called” by inserting that “function” in a cell.

Overall, it thus seems clear that “signal processing function” in the asserted claims, such as the “digital signal processor” limitation of claim 1 of the ’542 patent:

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

means “a set of instructions for processing audio signals,” as Crest proposed. That does not result in a redundancy between “algorithm” and “function,” although both terms, in a general sense, may constitute a “set of instructions.” The foregoing indicates that one of ordinary skill in the art would draw a distinction between “algorithm” and “function” in that “function” would be understood as referring to a subset of instructions, or a subroutine, within the broader set of instructions constituting an “algorithm.”

With respect to QSC’s contention that the term more broadly includes “digital and analog circuitry,” QSC, again, urges that the specification of the ’542 patent defines “signal processing functions” as ““a crossover function in which audio-frequency input to the signal processing circuit is divided into two or more bands of frequencies,” ’542 patent, col. 1, lines 24-26, and “a band splitting or eliminating function, a volume control function, an equalizing function, a frequency division function, an equalizing function, a frequency division function, a limiter or compression function, a microphone or line level mixer, an ambient sense level control function and any other suitable function,” ’542 patent, col. 1, lines 31-37, that is true – so far as it goes.

In describing Fig. 3 and the prior art:

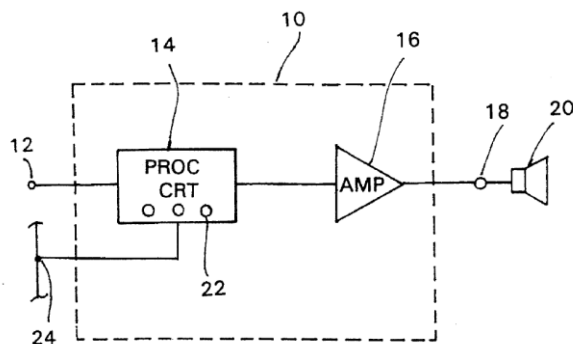


FIG. 3
PRIOR ART

in the portion of the specification that QSC refers to, the specification explains:

Conventional amplifiers, such as the amplifier 10 shown in FIG. 3, typically have a signal path including an input port 12, a signal processing circuit 14, a power amplifier 16 and an output port 18 connected to a load such as a loudspeaker 20. The signal processing circuit 14 and power amplifier 16 form an integral unit as seen in FIG. 3. The signal processing circuit 14 includes various analog and/or digital components such as

resistors, capacitors, switches and other electronic devices that together define a signal processing function.

The signal processing function may be a crossover function in which audio-frequency input to the signal processing circuit is divided into two or more bands of frequencies. Typically, a high frequency band is separated from a low frequency band so that the high frequency band can be sent to a tweeter of the loudspeaker and the low frequency band can be sent to the woofer of the loudspeaker. Other functions defined by the signal processing circuit components may include a band splitting or eliminating function, a volume control function, an equalizing function, a frequency division function, a limiter or compression function, a microphone or line level mixer, an ambient sense level control function and any other suitable function.

Using the example of a crossover function discussed above, the signal processing circuit 14 defines both the signal processing function (crossover), as well as, signal processing function parameters, such as a crossover frequency and amplitude. More specifically, the various signal processing circuit elements define the exact amplitude and frequency that determines how to divide the audio-frequency input into the high frequency band and the low frequency band.

'542 patent, col. 1, lines 15-45. Thus, the examples given *vis-à-vis* the prior art of “signal processing functions” are “a crossover function,” and “a band splitting or eliminating function, a volume control function, an equalizing function, a frequency division function, a limiter or compression function, a microphone or line level mixer, an ambient sense level control function and any other suitable function.”

However, the specification then goes on to explain how such “functions” were implemented on “conventional signal processing circuits 14”:

Conventional signal processing circuits 14 are usually comprised of analog and digital components on a printed circuit board. The signal processing function parameters, such as a crossover frequency and amplitude, can be changed by adjusting control knobs 22 provided on an amplifier housing (not shown) and operatively connected to the components of the signal processing circuit. Alternatively, the signal processing function parameters may be modified by signals input via a program bus 24 from a network (not shown) of a plurality of interconnected amplifiers controlled by a computer or similar device.

'542 patent, col. 1, lines 46-57. Namely, those functions were changed by control knobs 22 or *via* a program bus 24.

The specification then explains the problem with the prior art:

However, with this amplifier 10, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed. Although the user

can change the signal processing function parameters as described above, it is often necessary or desirable to change the signal processing function or even combine several different signal processing functions in the signal processing circuit. This is not possible with conventional amplifiers.

'542 patent, col. 1, lines 58-65. Namely, although the “signal processing function parameters” could be changed, the “signal processing function” could not be easily changed. Namely, a knob for controlling the parameters of, for example, the crossover frequency and amplitude could be rotated, but the “function,” the crossover frequency and amplitude could not be changed without changed or combined with other functions without “rewiring” the circuit.

The same is true *vis-à-vis* the other prior art configuration of Fig. 4:

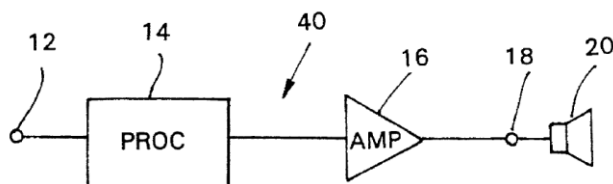


FIG. 4
PRIOR ART

The specification explains that:

Another embodiment of a conventional amplifier system 40 is shown in FIG. 4 wherein like reference numerals indicate like elements to avoid repetition. In this type of amplifier system, the power amplifier 16 and signal processing circuit 14 do not form an integral unit as in the amplifier 10 of FIG. 3 but instead are separate units that are interconnected. The signal processing circuit 14 in this type of amplifier system 40 is a dedicated function unit that cannot be modified without removing and/or replacing the signal processing circuit elements. Thus, the signal processing function and associated parameters in this amplifier system cannot be changed.

Although it is possible to change the signal processing function and associated parameters of the amplifier system 40 and amplifier 10 by removing and modifying the signal processing circuit, this requires a great deal of time and effort and additional signal processing components. Also, the modification, removal and/or replacement of the various signal processing circuit elements is time consuming and difficult because the signal processing circuit elements are typically plug-in or solderable components.

'542 patent, col. 1, line 66-col. 2, line 19.

Given that “background of the prior art” description, the specification then explains:

There exists a need for an improved amplifier signal processing circuit capable of modifying both signal processing functions and signal processing function parameters.

’542 patent, col. 2, lines 23-25, and further:

A preferred embodiment of the present invention provides an amplifier having a digital signal processor for selectively programming signal processing functions and signal processing function parameters.

’542 patent, col. 2, lines 26-28.

Contrary to QSC’s argument, the specification, in the portions that QSC relies on, does not state or require that “signal processing function,” understood in the context of the described and claimed invention, must include “digital and analog circuitry.”

Also, contrary to QSC’s argument that Crest’s references to the specification do not support a distinction between “(1) ‘program and program data’ and ‘algorithms’ that define signal processing functions and (2) the ‘signal processing functions’ themselves,” QSC’s Resp. Brief [Dkt. 192] at 28, the specification does support that distinction.

The portion of the specification QSC (and Crest) refer to is the ’542 patent, col. 6, lines 49-52. That portion of the specification explains:

The signals received from the network bus 300 and the signal programming port 208 are control signals. The control signals include audio signal processing programs and program data for defining the signal processing function and parameters of the amplifier 100. (emphasis added)

As noted above, there is a distinction between “algorithm” or “program” and “function” in that “function” refers to a subset of instructions, or a subroutine, within the broader set of instructions constituting an “algorithm” or “program.” The specification is consistent in explaining that the “control signals” “include” *etc.*

Lastly, although the focus above has been on the ’542 patent, neither Crest nor QSC has urged a different construction for the same phrase in the ’544 patent.

3. Recommendation

For the foregoing reasons, the master recommends that the Court construe “signal processing function” in claims 1, 5, 11-13 of the ’542 patent, and in claims 1, 20 and 23 of the ’544 patent as “a set of instructions for processing audio signals.”

D. “capable of receiving and storing”

The parties’ proposed the following contested constructions:

Claim Nos.	Crest’s Proposed Construction	QSC’s Proposed Construction
’542 patent, cls. 1, 5 and 13	No construction needed. Otherwise: “able to acquire or reserve for future use”	“capable of being easily and quickly changed or programmed” or, per QSC’s Response, “capable of quickly and easily changing or programming”
AJCCS [Dkt. 184] at 6, Crest’s Op. Brief [Dkt. 191] at 19, QSC’s Resp. Brief [Dkt. 192] at 29		

1. Representative Claim

Claim 1 of the ’542 patent is representative:

1. An amplifier comprising:

a power amplifier; and

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

2. The Parties’ Arguments

a) Crest’s Opening Brief

Crest first urges that the disputed phrase does not require construction and takes its “ordinary and customary meaning.” Crest’s Op. Brief [Dkt. 191] at 19, citing *Phillips*, 415 F.3d at 1312-13.

In the context of the claim language, Crest urges that “capable of receiving and storing” simply means that the “digital signal processor” is capable of performing “receiving and storing” – here, “at least one of an algorithm.” Crest urges that its proposed construction is consistent with that “ordinary and customary meaning.” *Id.* at 20.

With respect to QSC’s proposed construction, Crest urges that “Defendant’s proposed construction erroneously refers to an attribute that a thing possesses rather than actions that a thing may perform. When read in the context of the claims, Defendant’s draft construction improperly infers that a digital signal processor must have the attributes of being changed or programmed. This construction is erroneous, because it fails to address that a ‘thing,’ such as a digital signal processor, may perform a certain type of action. Put another way, Defendant’s suggested construction focuses on properties that describe a thing, itself, rather than actions that such a thing may perform.” *Id.*

Crest further says that “[t]his flaw in Defendant’s construction is clear when one replaces the disputed term in the claim with Defendant’s proposed construction of the term. Under Defendant’s construction, claim 1 of the ’542 patent would read: ‘a digital signal processor [capable of being easily and quickly changed or programmed] at least one of an algorithm’ Defendant’s proposed construction of the term renders the phrase unintelligible. By contrast, Crest Audio’s construction makes sense when read in the claim: ‘a digital signal processor [able to acquire or reserve for future use] at least one of an algorithm’ ” *Id.*

Crest also urges that there is no support in the claim language for adding “easily and quickly” into the claim per QSC’s proposed construction.

With respect to the specification, Crest points to the ’542 patent, col. 6, lines 4-7 providing “[t]he digital signal processor 250 is capable of receiving and storing an algorithm or program that defines a signal processing function and/or corresponding function parameters,” and urges that its proposed construction is consistent. *Id.* at 21.

As for QSC’s reliance on that portion of the specification providing “[t]he preferred embodiment of the present invention provides significant improvements and advantages because it allows one or more signal processing functions and signal processing function parameters to be easily and quickly programmed,” Crest contends that “the Federal Circuit has cautioned that in attempting to overcome the presumption that the ordinary meaning applies, one cannot do so simply by ‘pointing to an embodiment disclosed in the specification or prosecution history.’ ” *Id.*, quoting *Toshiba Corp. v.*

Imation Corp., 681 F.3d 1358, 1369 (Fed. Cir. 2012), and also citing *Karlin Tech. Inc. v. Surgical Dynamics, Inc.*, 177 F.3d 968, 973 (Fed. Cir. 1999) (“The general rule, of course, is that the claims of a patent are not limited to the preferred embodiment, unless by their own language.”). Crest urges that “the mere fact that the specification identifies a benefit of one embodiment does not mean that those benefits are to be imported into the meaning of the claim terms.” *Id.* at 21-22.

With respect to the prosecution history of the '542 patent, Exhibit D [Dkt. 191-4] to Crest's opening brief is a copy of that prosecution history. That prosecution history is discussed at length above in connection with first disputed term, “an amplifier comprising.”

Suffice it to say, after the Office Action of February 14, 1996, the applicant amended application claim 1 as follows (brackets indicating deletions, underling indicating additions, in accordance with PTO practice):

1. (Amended) An amplifier comprising:
 an amplifier housing;
 a power amplifier; and
 a digital signal processor [module] capable of
receiving and storing at least one of an algorithm which defines
at least one signal processing function and signal processing
function parameters.
the digital signal processor being connected to the
 power amplifier and located within the amplifier housing [for
 defining at least one signal processing function for the
 amplifier].

Ex. D [Dkt. 191-4] CREST000492. Earlier, claims 1 and 2 “as filed” provided:

1. An amplifier comprising:
 an amplifier housing;
 a power amplifier; and
 a digital signal processor module connected to
 the power amplifier and located within the amplifier
 housing for defining at least one signal processing
 function for the amplifier.

2. The amplifier of claim 1, wherein the
 digital signal processor module comprises a programmable
 digital signal processor for storing a program that
 defines the signal processing function which modifies an
 input signal according to the signal.

Ex. D [Dkt. 191-4] CREST000467.

In the response to the Office Action of February 14, 1996, the applicant canceled dependent claim 2, and added those limitations to claim 1. Original claim 1 had called for a “digital signal processor module” and in dependent claim 2 further provided that “module” comprised a “programmable digital signal processor for storing a program * * *.” The amendment in the response to the February 14th Office action deleted “module” and changed the “for storing a program” language of claim 2 to “capable of receiving and storing at least one of an algorithm * * *.”

The applicant also argued over the examiner’s rejection based on the Van Hulle *et al.* reference. The applicant first addressed “conventional amplifiers”:

Conventional amplifiers having signal processing circuits are comprised of analog and digital components on a printed circuit board. The signal processing function parameters, for example, crossover frequency and amplitude, can be changed by adjusting control knobs provided on an amplifier housing which are operatively connected to the components of the signal processing circuit. Alternatively, the signal processing function parameters may be modified by signals input via a computer or similar device under program control.

Ex. D [Dkt. 191-4] CREST000507 (as noted above during the earlier discussion of the ’542 patent prosecution history, the pages in Ex. D appear to have been “reordered”).

The applicant then discussed the problem with “conventional amplifiers”:

However, with the conventional amplifiers as discussed above, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed. Although the user can change the signal processing function parameters as described above, it is often necessary or desirable to change the signal processing function or even combine several different signal processing functions in the signal processing circuit. This is not possible with conventional amplifiers.

Id.

The applicant next discussed the Van Hulle reference:

The system of the Van Hulle reference employs a conventional amplifier as described above where only the function parameters of the signal processor can be modified. Indeed, in the system of the Van Hulle reference, "[t]he audio signal is processed in the signal processing circuit 2 in response to setting signals I in the form of gain factors, filter coefficients and the like ..." (Col. 4, lines 52-55). The "gain factors, filter coefficients and the like" described in the Van Hulle reference are merely the function parameters of the analog and/or digital circuits forming the processing function, which circuits are fixed on a circuit board.

Id. at CREST000507-08.

The applicant then urged the "novel combination of the present invention":

Conversely, the novel combination of the present invention as recited in amended claim 1 requires an amplifier comprising a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters. Thus, the amplifier of the present invention can receive an algorithm which defines an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacture. In addition, the digital signal processor of the amplifier as claimed can receive signal processing function parameters if desired.

Id. at CREST000508.

The applicant then urged how the claims defined over the Van Hulle reference:

The Van Hulle reference does not teach or suggest an amplifier comprising a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters as recited in amended claim 1. Indeed, the Van Hulle reference teaches a fixed function circuit where only the parameters of the function may be modified. Therefore, one skilled in the art would not have been led to the novel combination as recited in amended claim 1 in view of the Van Hulle reference. Accordingly, Applicant requests that the Examiner's 35 U.S.C. §103 rejection of claim 1 be withdrawn.

Id.

Subsequently, in a response to the examiner's Office Action of September 17, 1996, which again rejected the claims over the Van Hulle reference, application claim 4, which became patent claim 1, was amended as follows:

1. A. (Twice Amended) An amplifier comprising:
a power amplifier; and
a digital signal processor capable of receiving and
storing at least one of an algorithm which defines at least one
signal processing function and signal processing function
parameters,
the digital signal processor being connected to the
power amplifier and having [The amplifier of claim 1, wherein the
digital signal processor comprises] a first input for receiving
at least one of the algorithm and signal processing function
parameters and an input/output port for receiving performance
characteristics of the power amplifier and for transmitting
control signals for modifying the performance of the power
amplifier.

Id. at CREST000501-02.

Crest says *vis-à-vis* the prosecution history that “[d]efendant is apparently seeking to import the limitation of performing action ‘easily and quickly’ by misreading the Response to the Office Action mailed September 17, 1996, which states ‘with the conventional amplifiers as discussed above, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be

easily changed.’ Ex. D at CREST000507. The prosecution history demonstrates that, while the patentee describes conventional amplifiers as not being ‘easily changed’ the patentee chose not to insert this limitation into the claims as a claim amendment.” Crest’s Op. Brief [Dkt. 191] at 22.

Crest further points to several dictionaries defining “capable,” “receive,” and “store” as supporting its proposed construction.

Lastly, Crest urges that QSC’s proposed construction contradicts the testimony of Crest’s expert: “Specifically, Crest Audio’s expert explains that “[t]he term “programmed” means to be caused to behave in a predetermined way” which is not the same as “storing” or “receiving” in their ordinary meanings.’ Ex. J at ¶ 33. Therefore, Defendant’s proposed construction should not be adopted in place of Crest Audio’s proper construction, because Defendant’s alternative construction unnecessarily and improperly limits the term to require the attributes of being easily and quickly programmed.” *Id.*

b) QSC’s Responsive Brief

QSC says that its proposed construction “is compelled by the intrinsic evidence.” QSC’s Resp. Brief [Dkt. 192] at 29. QSC contends that “[t]he ’542 patent’s signature innovation is that the use of a DSP in an amplifier allows signal-processing functions and parameters to be quickly and easily changed.” *Id.* at 30.

QSC urges that with the advent of DSPs, the inventor had a readily available solution to the problem identified in the prior art. QSC points to the specification advising that “the present invention *provides significant improvements and advantages because* it allows one or more signal processing functions and signal-processing-function parameters to be *easily and quickly programmed.*” *Id.*, quoting ’542 patent, col. 3, lines 55-59 (emphasis by QSC).

QSC says that “[t]hus, the alleged invention is not a DSP that can ‘acquire and reserve for future use’ signal processing functions and parameters—that existed long before the inventor came along. Instead, the alleged invention is a DSP that allows signal-processing functions and parameters to be quickly and easily changed or programmed.” QSC’s Resp. Brief [Dkt. 192] at 30.

QSC also points to the prosecution history above. In connection with the amendment to claim 1 noted above, QSC points to the applicant’s argument that the claims defined over the Van Hulle reference because “ ... with the conventional amplifiers as discussed above [and disclosed by

the prior art], the signal processing function is fixed by the circuit design of the signal processing circuit *and cannot be easily changed.*” QSC’s Resp. Brief [Dkt. 192] at 31, quoting the July 18, 1996 amendment (emphasis by QSC).

QSC also points to the applicant’s argument that in Van Hulle the signal processing function was “fixed on a circuit board,” while in contrast, according to the applicant “the amplifier of the present invention can receive an algorithm which defines an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacture.” *Id.* quoting the July 18, 1996 amendment (emphasis in original).

Thus, says QSC, “the inventor repeatedly and explicitly touted the quick and easy programming of his amplifier as advantageous over the prior art.” *Id.*

QSC criticizes Crest’s proposed construction as “based on definitions plucked from general-purpose dictionaries, most of which were published *well after* the inventor filed the application leading to the ’542 patent,” and “merely replaces commonly understood words with other commonly understood words, *i.e.*, ‘acquire’ for ‘receive’ and ‘reserve’ for ‘store.’” *Id.* at 32-33.

QSC lastly urges that Crest’s proposed construction would improperly broaden the claims: “Under Crest’s construction the DSP merely must be able to either ‘acquire’ or ‘reserve’ for future use, but it need not do both. This is inconsistent with the claim language. The claims require that the DPS ‘be capable of receiving *and* storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters.’ So, Crest’s construction—where the DSP needs only to ‘acquire’ or ‘store’ —must be rejected.” *Id.* at 33.

c) Crest’s Reply Brief

First, Crest urges that QSC’s proposed construction has changed from “capable of being easily and quickly changed or programmed” to “capable of quickly and easily *changing* or *programming*.” Crest’s Reply [Dkt. 193] at 11-12. Crest urges that the change is untimely and should be rejected.

Second, Crest criticizes QSC’s proposed construction as including “confusingly vague terms ‘easily’ and ‘quickly’ and the equally confusing term ‘changing or programming.’” Crest asks rhetorically: “When does ‘easily’ become too hard and, thus, beyond the scope of the claim phrase? Similarly, how quick is ‘quickly?’ Thirty seconds? A minute? Ten minutes? An hour? A day?” *Id.* at 12.

Crest also urges that it did not disavow claim scope in either the specification or prosecution history. Crest notes that Federal Circuit precedent requires a clear and unambiguous disavowal of claim scope. *Id.* at 13, citing *Sorensen v. ITC*, 427 F.3d 1375, 1378 (Fed. Cir. 2005) (“In order to disavow claim scope, a patent applicant must clearly and unambiguously express surrender of subject matter during prosecution.”); *Brookhill-Wilk 1, LLC v. Intuitive Surgical, Inc.*, 334 F.3d 1294, 1301 (Fed. Cir. 2003) (“[A]bsent a clear disclaimer of particular subject matter, the fact that the inventor anticipated that the invention may be used in a particular manner does not limit the scope to that narrow context.”); *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1331 (Fed. Cir. 2004) (“[W]hile claims must be construed in light of the specification, limitations from the specification are not to be read into the claims in the absence of a clear disavowal of claim scope.”). “In short, the construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (*en banc*) (citations omitted).

Lastly, Crest also denies attempting to broaden the claims. *Id.* at 13-14.

d) Parties’ Presentation Slides at Claim Construction Hearing

The parties presented the following slides at the claim construction hearing illustrating their respective arguments.

Crest’s Presentation Slides

Claim phrase: “capable of receiving and storing”

Crest Audio’s Proposed Interpretation	QSC’s Proposed Interpretation
No construction needed.	“capable of being easily and quickly changed or programmed”
Otherwise: “able to acquire or reserve for future use”	

No Reason Given to Construe

- Says construction “compelled” by intrinsic evid.
 - But only describes attributes of a DSP.
 - Sets DSP against a “DSP that can be easily and quickly changed” without explaining difference.
 - No reference for *how easily* or *how quickly*
 - Unclear how “changed or programmed” corresponds to “receiving and storing”
- More vague than claim language itself.

QSC: “capable of being easily and quickly changed or programmed”

- Untimely changes construction in Response to **changing** or programming
 - Results in completely new meaning
 - Gives DSP new capabilities
- No meaningful difference between an “or” and an “and” in Crest’s construction

QSC’s Presentation Slides

“capable of receiving and storing”

QSC’s Proposed Construction	Crest’s Proposed Construction
“capable of being easily and quickly changed or programmed”	“able to acquire or reserve for future use”

However, with this amplifier 10, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed. Although the user can change the signal processing function parameters as described above, it is often necessary or desirable to change the signal processing function or even combine several different signal processing functions in the signal processing circuit. This is not possible with conventional amplifiers.

522 patent at 1:38-45

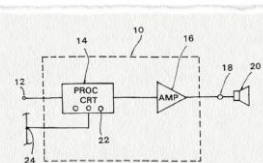


FIG. 3
PRIOR ART

Another embodiment of a conventional amplifier system 40 is shown in FIG. 4 wherein like reference numerals indicate like elements to avoid repetition. In this type of amplifier system, the power amplifier 16 and signal processing circuit 14 do not form an integral unit as in the amplifier 10 of FIG. 3 but instead are separate units that are interconnected. The signal processing circuit 14 in this type of amplifier system 40 is a dedicated function unit that cannot be modified without removing and/or replacing the signal processing circuit elements. Thus, the signal processing function and associated parameters in this amplifier system cannot be changed.

Although it is possible to change the signal processing function and associated parameters of the amplifier system 40 and amplifier 10 by removing and modifying the signal processing circuit, this requires a great deal of time and effort and additional signal processing components. Also, the modification, removal and/or replacement of the various signal processing circuit elements is time-consuming and difficult because the signal processing circuit elements are typically plug-in or solderable components.

522 patent at 1:56-2:10

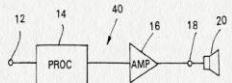


FIG. 4
PRIOR ART

The preferred embodiment of the present invention provides significant improvements and advantages because it allows one or more signal processing functions and signal processing function parameters to be easily and quickly programmed. Also, because the digital signal processor is programmable, the signal processing functions and parameters can be changed any number of times by simply inputting new parameters or downloading a new program. The functions and parameters are stored in a non-volatile memory in the digital signal processor so that the programmed functions and parameters are unaffected by turning on and off the amplifier. In addition, the digital signal processor according to the preferred embodiment of the

522 patent at 2:32-47

QSC's Presentation Slides

Further, the digital signal processor allows the signal processing functions to be combined as desired. Also, **because the digital signal processor can change a function or parameter in real time while the amplifier is operating, a user can hear the difference in sound produced by a load such as a loudspeaker to determine if the change to the function or parameter is acceptable.**

542 patent at 4:6-13

IN THE CLAIMS:

Please cancel claims 2 and 13-23 without prejudice.

Please amend the claims as follows:

1. (Amended) An amplifier comprising:

an amplifier housing;

a power amplifier; and

a digital signal processor (module) capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters.

the digital signal processor being connected to the power amplifier and located within the amplifier housing [for defining at least one signal processing function for the amplifier].

QSC Ex. B at QSC0048090-1

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User of prior art amp can't change function

However, with the conventional amplifiers as discussed above, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed. Although the user can change the signal processing function parameters as described above, it is often necessary or desirable to change the signal processing function or even combine several different signal processing functions in the signal processing circuit. This is not possible with conventional amplifiers.

But user of supposed invention can

Conversely, the novel combination of the present invention as recited in amended claim 1 requires an amplifier comprising a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters. Thus, the amplifier of the present invention can receive an algorithm which defines an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacture. In addition, the digital signal processor of the amplifier as claimed can receive signal processing function parameters if desired.

QSC Ex. B at QSC0048096-7

54

Cited on pages, 2, 24, and 32

The TRUSTEES OF COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK, Plaintiff-Appellant
v.
SYMANTEC CORPORATION, Defendant-Appellee.
No. 2015-1116.
United States Court of Appeals, Federal Circuit,
Feb. 2, 2016.

Trustees of Columbia Univ. in City of New York v. Symantec Corp., 812 F.3d 1259, 1263 (Fed. Cir. 2016)

Our case law does not require explicit redefinition or disavowal. See, e.g., *Aventis Pharma S.A. v. Hospira, Inc.*, 675 F.3d 1324, 1330 (Fed.Cir.2012) ("This clear expression need not be *in haec verba* but may be inferred from clear limiting descriptions of the invention in the specification or prosecution history."). Indeed, our en banc *Phillips* opinion rejected this very approach. In *Phillips*, we rejected a line of cases following *Texas Digital Systems, Inc. v. Telegenix, Inc.*, where we held that "terms used in the claims bear a 'heavy presumption' that they... have the ordinary meaning that would be attributed to those words by persons skilled in the relevant art [and] unless compelled otherwise, a court will give a claim term the full range of its ordinary meaning." 308 F.3d 1193, 1202 (Fed.Cir.2002). Specifically, *Phillips* rejected an approach "in which the specification should be consulted only after a determination is made, whether based on a dictionary, treatise, or other source, as to the ordinary meaning or meanings of the claim term in dispute." 415 F.3d at 1320. As *Phillips* carefully

With respect to QSC's argument that Crest disavowed claim scope in both the specification and prosecution history of the '542 patent in view of prior art, QSC cites absolutely no supporting authority. This is not surprising because established Federal Circuit precedent clearly precludes such a practice absent clear and unambiguous disavowal of claim scope. See *Sorensen v. ITC*, 427 F.3d 1375, 1378 (Fed. Cir. 2005) ("In order to disavow claim scope, a patent applicant must clearly and unambiguously express surrender of subject matter during

Crest Reply at 13

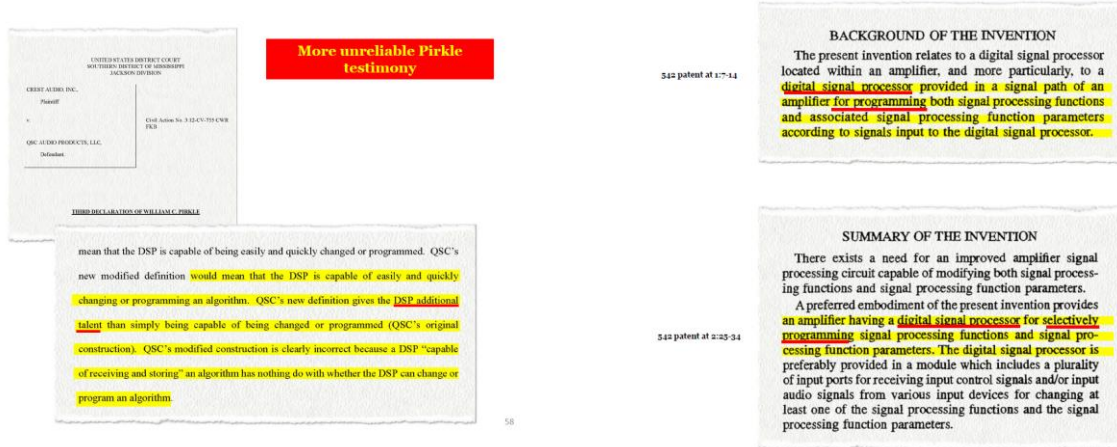
Pedantic Objection Fails

"a digital signal processor capable of receiving and storing at least one of an algorithm..."

What is the digital signal processor capable of?

"being easily and quickly changed or programmed"

QSC's Presentation Slides



3. Discussion

Once again, beginning with the claim language, the digital signal processor limitation provides:

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters (emphasis added)

a) Not Ambiguous

Neither Crest nor QSC has shown (or alleged) that the claim language is ambiguous or otherwise requires “construction” in the sense of being so “technical” that a jury would not understand what “capable of receiving and storing” means. Nor has either Crest or QSC advocated that the inventor acted as his own lexicographer and ascribed a “special meaning” to the phrase that requires explanation.

Additionally, neither QSC's proposed construction (“capable of being easily and quickly changed or programmed”) nor Crest's proposed construction (“able to acquire or [and] reserve for future use”) actually “construes” the claim language (“capable of receiving and storing”). Instead, both constructions essentially rewrite the claim language. But, “[c]ourts do not rewrite claims,” *K-2 Corp. v. Salomon SA*, 191 F.3d 1356, 1364 (Fed. Cir. 1999), instead courts “give effect to the terms chosen by the patentee.” “Courts can neither broaden nor narrow the claims to give the patentee something different than what he has set forth. No matter how great the temptations of fairness or

policy making, courts do not rework claims. They only interpret them.” *Autogiro Co. of America v. United States*, 384 F.2d 391, 396 (Ct.Cl. 1967).

Also, as noted above in conjunction with recommending a construction for “signal processing function,” the specification of the ’542 patent plainly equates “algorithm” and “program.” ’542 patent, col. 6, lines 4-7 (“The digital signal processor 250 is capable of receiving and storing an algorithm or program that defines a signal processing function and/or corresponding function parameters.”). That is further confirmed by the prosecution history discussed above in which original claim 2, which called for “a programmable digital signal processor for storing a program,” [Dkt. 191-4] CREST000467 was subsequently changed in amended claim 1 to “capable of receiving and storing at least one of an algorithm.” *Id.* at CREST000492.

Additionally, the specification clearly explains that:

A preferred embodiment of the present invention provides an amplifier having a digital signal processor for selectively programming signal processing functions and signal processing function parameters.

’542 patent, col. 2, lines 25-28.

The digital signal processing module also preferably includes a programming port for being removably connected to a portable amplifier programmer described in U.S. patent application * * *. The portable programmer inputs command signals for changing at least one of the signal processing functions and corresponding function parameters according to information input to the portable programmer.

’542 patent, col. 2, line 60-col. 3, line 5.

The digital signal processor preferably includes a nonvolatile storage device or memory for storing the programs and program data that define the signal processing functions and function parameters. The non-volatility of the storage device allows the signal processing functions and parameters to be unaffected by connecting and disconnecting a power source to the amplifier.

’542 patent, col. 3, lines 6-12.

A controller, preferably in the form of a microprocessor, is provided in the digital signal processor for processing the control signals for modifying signal processing programs and coefficients to modify the functions and function parameters defined by the program.

’542 patent, col. 3, lines 13-17.

Digital signal processor 250 is programmable and performs a signal processing operation for amplifying or modifying the characteristics of an input audio signal to produce a modified output signal. The digital signal processor 250 is capable of receiving and storing an algorithm or program that defines a signal processing function and/or corresponding function parameters. In addition, the digital signal processor 250 is adapted to receive control signals for modifying the signal processing function and associated

'542 patent, col. 6, lines 1-9.

The digital signal processor 250 preferably has a nonvolatile storage device for storing input programs. Program data and control signals. The non-volatility prevents the programs and data from being erased upon disconnection of a power source from the amplifier 100. Also, because the digital signal processor 250 is programmable and has a non-volatile storage device, a new signal processing function program can be input and stored as desired.

'542 patent, col. 6, lines 20-28.

Accordingly, there is simply no reasonable or justifiable dispute about the plain meaning of “capable of receiving and storing” in the context of the claim language. The words mean what they say – and neither QSC nor Crest contends otherwise. And, in a broader context, “a digital signal processor capable of receiving and storing at least one of an algorithm [or program]” simply means a programmable digital signal processor – namely, exactly what the specification describes.

b) Advantages of an Invention

But, of course, that is not the end of the matter. QSC urges that the phrase must be limited in light of the specification and prosecution history to “capable of being easily and quickly changed or programmed.”

The specification explains that:

The preferred embodiment of the present invention provides significant improvements and advantages because it allows one or more signal processing functions and signal processing function parameters to be easily and quickly programmed. Also, because the digital signal processor is programmable, the signal processing functions and parameters can be changed any number of times by simply inputting new parameters or downloading a new program.

'542 patent, col. 3, lines 55-62.

Plainly the use of a programmable DSP has the advantage of being “easily and quickly programmed,” and “the signal processing functions and parameters can be changed any number of

times by simply inputting new parameters or downloading a new program.” But the “advantages” of an invention are not required to be read into the claims.

In *Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327 (Fed. Cir. 2004), for example, the patent-in-suit was drawn to a wireless remote-controlled, portable search light. The accused search light, sold through Sam’s Club, was allegedly a low-end copy of the commercial embodiment of the invention, but had an “apparently arbitrary, and rather suspicious, placement of a plastic ‘stop’ piece which prevented” the search light from rotating through 360°.

The asserted claim called for “horizontal drive means for rotating said lamp unit in a horizontal direction.” Wal-Mart urged that the specification and prosecution history required construing the claim to require rotation through 360°. The district court refused to so limit the claim, and the Federal Circuit affirmed.

The specification provided:

[a] searchlight apparatus in accordance with the present invention includes a lamp unit mounted in a housing which has a motor-driven vertical drive mechanism for tilting the lamp unit in a vertical direction and a motor-driven horizontal drive mechanism for rotating the lamp unit in a horizontal direction through at least 360°.

Wal-Mart relied on that statement in asserting that the claims should be limited to requiring rotation through 360°.

The Federal Circuit reiterated:

“In construing claims, the analytical focus must begin and remain centered on the language of the claims themselves, for it is that language that the patentee chose to use ‘to particularly point[] out and distinctly claim[] the subject matter which the patentee regards as his invention.’” *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1331 (Fed.Cir.2001) (quoting 35 U.S.C. § 112, ¶ 2). While claims must be construed in light of the specification, *Markman*, 52 F.3d at 979, limitations from the specification are not to be read into the claims, *Comark Communications, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186 (Fed.Cir.1998), for “[i]t is the claims that measure the invention,” *SRI Int’l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1121 (Fed. Cir.1985). The written description may, however, restrict the scope of the claims if “the patentee demonstrated an intent to deviate from the ordinary and accustomed meaning of a claim term by redefining the term or by characterizing the invention in the intrinsic record using words or expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.” *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed.Cir.2002).

355 F.3d at 1331.

The Federal Circuit found “no clear definition or disavowal of claim scope in the written description of the '989 patent that would limit claim 11 to horizontal rotation through 360°. While it is true that the patentees describe their invention as having the ability to rotate through 360°, this particular advantage is but one feature of the invented search light. The written description describes other significant features as well, such as the use of a particular wireless remote control and differing mechanisms for attaching the search light to the roof of a vehicle. The patentees were not required to include within each of their claims all of these advantages or features described as significant or important in the written description.” *Id.*

The Federal Circuit also noted that “[n]or do we find the disclosure of a single embodiment to be limiting in this case. An applicant is not necessarily required by 35 U.S.C. § 112, ¶ 1 to describe more embodiments than its preferred one, and we have outright rejected the notion that disclosure of a single embodiment necessarily limits the claims. *See Teleflex*, 299 F.3d at 1327 (stating that “the number of embodiments disclosed in the specification is not determinative of the meaning of disputed claim terms”). 355 F.3d at 1331-32.

The situation here is similar. The specification in explaining that:

The preferred embodiment of the present invention provides significant improvements and advantages because it allows one or more signal processing functions and signal processing function parameters to be easily and quickly programmed. Also, because the digital signal processor is programmable, the signal processing functions and parameters can be changed any number of times by simply inputting new parameters or downloading a new program.

'542 patent, col. 3, lines 55-62, is simply explaining certain advantages of the preferred embodiment and from using a programmable DSP. Explaining that signal processing functions and signal processing function parameters can “be easily and quickly programmed” and that signal processing functions and parameters “can be changed any number of times” are not, in context, statements that “define” the invention.

As the Federal Circuit noted *en banc* in *Phillips*, “although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments,” and “we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment.” 415 F.3d at 1323.

Additionally, once one begins to “import” features from the specification into the claims, where does one stop? *McCarty v. Lehigh Val. R.R.*, 160 U.S. 110, 116 (1895) (“[I]f we once begin to include elements not mentioned in the claim in order to limit such claim * * *, we should never know where to stop. * * * This doctrine is too obviously untenable to require argument.”)

For example, the same portion of the specification says that “[t]he functions and parameters are stored in a non-volatile memory in the digital signal processor so that the programmed functions and parameters are unaffected by turning on and off the amplifier.” ’542 patent, col. 3, lines 63-66. Must “capable of receiving and storing” be construed as being limited to “non-volatile memory”? The specification also says that “the digital signal processor according to the preferred embodiment of the present invention allows for several different input devices to be used to input either digital or analog audio signals and/or control signals to selectively modify at least one of a plurality of signal processing functions and signal processing function parameters.” ’542 patent, col. 3, line 66-col. 4, line 5. Must “capable of receiving and storing” be construed as allowing for several different input devices? Or, as inputting either digital or analog audio signals? And the list goes on.

c) Opinion in *Trustees of Columbia University*

Although normally the foregoing would be sufficient to resolve the issue, at least *vis-à-vis* the specification. However, here, QSC relies heavily on *Trustees of Columbia University v. Symantec Corp.*, 811 F.3d 1359 (Fed. Cir. 2016), and in particular the court’s comment that “[o]ur case law does not require explicit redefinition or disavowal.” 811 F.3d at 1363. QSC seems to suggest that case represents “new” or “restated” law, and may express some tension between that case and prior cases. But on closer reading, there is no “new” or “restated” law, and there is no tension with prior cases.

In prior cases such as the frequently cited opinion in *Thorner v. Sony Computer Entertainment America LLC*, 669 F.3d 1362 (Fed.Cir.2012), the Federal Circuit has extensively discussed claim construction, especially in the context where there is argument that the patentee acted as his own lexicographer or where there is an argument that the patentee, in the specification or during prosecution, disavowed claim scope.

In *Thorner*, for example, the Federal Circuit explained that (in this instance, the court’s opinion will be presented in full, including with citations):

We review claim construction de novo. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1455-56 (Fed.Cir.1998) (en banc). The words of a claim are generally given their ordinary

and customary meaning as understood by a person of ordinary skill in the art when read in the context of the specification and prosecution history. See *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed.Cir.2005) (*en banc*). There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution. *Vitronics Corp. v. Conception, Inc.*, 90 F.3d 1576, 1580 (Fed.Cir.1996). The use of the term "attached" in this specification does not meet either of these exceptions.

669 F.3d at 1365.

The Federal Circuit next described when a patentee may be found to have acted as his own lexicographer:

To act as its own lexicographer, a patentee must “clearly set forth a definition of the disputed claim term” other than its plain and ordinary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed.Cir.2002). It is not enough for a patentee to simply disclose a single embodiment or use a word in the same manner in all embodiments, the patentee must “clearly express an intent” to redefine the term. *Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1381 (Fed.Cir.2008); see also *Kara Tech. Inc. v. Stamps.com*, 582 F.3d 1341, 1347-48 (Fed.Cir.2009). “[T]he inventor's written description of the invention, for example, is relevant and controlling insofar as it provides clear lexicography ...” *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed.Cir.2004) (emphasis added). For example, in *3M Innovative Properties Co. v. Avery Dennison Corp.*, we held that the patentee acted as its own lexicographer when the specification stated: “ ‘Multiple embossed’ means two or more embossing patterns are superimposed on the web to create a complex pattern of differing depths of embossing.” 350 F.3d 1365, 1369, 1371 (Fed.Cir.2004). Similarly, we limited a patentee to particular examples of solubilizers when it stated in the specification that “[t]he solubilizers suitable according to the invention are defined below.” *Astrazeneca AB v. Mutual Pharm. Co.*, 384 F.3d 1333, 1339 (Fed.Cir. 2004).

669 F.3d at 1365-66.

The Federal Circuit next described disavowal in terms of the specification:

The standard for disavowal of claim scope is similarly exacting. “Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question.” *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed.Cir. 2001). “The patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.” *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed.Cir.2002); see also *Home Diagnostics, Inc. v. LifeScan, Inc.*, 381 F.3d 1352, 1358 (Fed.Cir.2004) (“Absent a clear disavowal in the specification or the

prosecution history, the patentee is entitled to the full scope of its claim language.”). For example, in *SciMed*, the patentee described two different types of catheters in the prior art, those with dual lumens (side-by-side) and those with coaxial lumens. 242 F.3d at 1339. In discussing the prior art, the patentee disparaged the dual lumen configuration as larger than necessary and less pliable than the coaxial type. *Id.* at 1342. Further, the specification repeatedly described the “present invention” as a coaxial design. *Id.* Finally, the specification stated: “The intermediate sleeve structure defined above [coaxial design] is the basic sleeve structure for all embodiments of the present invention contemplated and disclosed herein.” *Id.* at 1343 (emphasis in original). This court held that collectively this amounted to disavowal of the dual lumen design.

669 F.3d at 1366.

The Federal Circuit further explained *vis-à-vis* the specification that:

Mere criticism of a particular embodiment encompassed in the plain meaning of a claim term is not sufficient to rise to the level of clear disavowal. *Epistar Corp. v. Int'l Trade Comm'n*, 566 F.3d 1321, 1335 (Fed.Cir.2009) (holding that even a direct criticism of a particular technique did not rise to the level of clear disavowal). In *Spine Solutions, Inc. v. Medtronic Sofamor Danek USA, Inc.*, we explained that even where a particular structure makes it “particularly difficult” to obtain certain benefits of the claimed invention, this does not rise to the level of disavowal of the structure. 620 F.3d 1305, 1315 (Fed.Cir.2010).

It is likewise not enough that the only embodiments, or all of the embodiments, contain a particular limitation. We do not read limitations from the specification into claims; we do not redefine words. Only the patentee can do that. To constitute disclaimer, there must be a clear and unmistakable disclaimer.

669 F.3d at 1366-67 (paragraphing added).

The Federal Circuit then added that:

It is the claims that define the metes and bounds of the patentee's invention. *Phillips*, 415 F.3d at 1313. The patentee is free to choose a broad term and expect to obtain the full scope of its plain and ordinary meaning unless the patentee explicitly redefines the term or disavows its full scope.

669 F.3d at 1367. The foregoing principals have been followed in countless cases.

In *Aventiss Pharma S.A. v. Hospira, Inc.*, 675 F.3d 1324 (Fed. Cir. 2012), the Federal Circuit reiterated that:

This court recently reiterated the stringent standard for narrowing a claim term beyond its plain and ordinary meaning in *Thorner v. Sony Computer Entertainment America L.L.C.*, 669 F.3d 1362 (Fed.Cir. 2012). There, we explained that we will only interpret a claim term more narrowly than its ordinary meaning under two circumstances: “1) when a

patentee sets out a definition and acts as [its] own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Id.* at 1365.

675 F.3d at 1330. The Federal Circuit added, quoting *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed.Cir.2002), that “[i]n other words, ‘the patentee must “clearly express an intent” to redefine the term.’ ” 675 F.3d at 1330.

The *Aventis* court added that “[t]his clear expression need not be *in haec verba* but may be inferred from clear limiting descriptions of the invention in the specification or prosecution history.” *Id.* The Federal Circuit did not provide any supporting citation, perhaps believing that the statement was so clearly reasonable that no citation was necessary. In any event, it has long been the rule, in a different context, that claims need not find *in haec verba* support in the specification to satisfy § 112(a). See e.g., *In re Smith*, 481 F.2d 910, 914 (CCPA 1973)(“This court has held that claimed subject matter need not be described *in haec verba* in the specification in order for that specification to satisfy the description requirement.”).

The *Aventis* court continued:

Similarly, to disavow claim scope, “[t]he patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.” *Id.* at 1366 [referring to *CCS Fitness*] (quoting *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed.Cir.2002)). Moreover, “[i]t is ... not enough that the only embodiments, or all of the embodiments, contain a particular limitation” to limit a claim term beyond its ordinary meaning. *Id.*

675 F.3d at 1330.

In *Aventis*, Sanofi had requested that the district court require that “perfusion” also be effective for treatment, and safe and stable (*i.e.* not precipitate) for at least eight hours. The district court declined to do so. The Federal Circuit agreed: “Neither the claims, the specification, nor the prosecution history suggest that the claimed perfusion must satisfy certain safety or efficacy standards.” 675 F.3d at 1330.

In its analysis, the *Aventis* court began with an “analysis with the language of the claims. *Phillips*, 415 F.3d at 1312.” 675 F.3d at 1330. The Federal Circuit noted that “[c]laim 5 requires that the ‘perfusion’ be ‘capable of being injected without anaphylactic or alcohol intoxication manifestations,’ but contains no limitations with respect to the claimed perfusion's stability.” *Id.*

The Federal Circuit then concluded that:

This interpretation of “perfusion” also is consistent with the teachings of the specification. Although the specification does refer to perfusions with a stability of at least eight hours, see '561 patent col.2 ll.43-45 (“The new perfusions [referring to examples in the specification] are stable from a physical standpoint, that is to say no precipitation phenomenon is seen to appear within approximately 8 hours.”), and the disclosed examples of perfusions have stabilities exceeding eight hours, see *id.* at col. 2 l. 59-col.3 l. 26, these general descriptions of the characteristics of embodiments do not suffice to limit the claims. See *Thorner*, 669 F.3d at 1366 (“It is likewise not enough that the only embodiments, or all of the embodiments, contain a particular limitation.”). Indeed, the specification expressly instructs that the disclosed examples “are not to be considered as limiting the invention.” '561 patent col.2 ll.53-54. Moreover, in contrast to the specification's discussion of anaphylactic and alcohol intoxication manifestations, nothing in the specification indicates that a minimum stability of eight hours is an essential feature of the claimed perfusion or an advantage of the perfusion over the prior art. See *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906-09 (Fed.Cir.2004) (distinguishing cases where the court narrowly construed an otherwise broad claim term). (emphasis added)

675 F.3d at 1331.

The *Aventis* court further noted *vis-à-vis* the prosecution history that:

Nor does the prosecution history evidence a clear and unmistakable disavowal of claim scope. The prosecution history can offer insight into the meaning of a particular claim term, but the “[c]laim language and the specification generally carry greater weight.” *HTC Corp. v. IP-Com GmbH & Co.*, 667 F.3d 1270, 1276 (Fed.Cir.2012). Here, the patentee's observation during prosecution that the perfusions in the Tarr reference demonstrated signs of precipitation after four hours and thirty minutes neither indicates that the claimed perfusion has a special definition nor clearly and unmistakably manifests the patentee's intention to limit claim 5 to perfusions that are stable for at least eight hours. The Tarr reference was not directed to the two-solvent solution of claim 5 but to a prior art three-solvent solution; the argument was that the presence of the third solvent materially affected the characteristics of the claimed composition. (emphasis added)

675 F.3d at 1331.

Thus, *Aventis* cites to and follows *Thorner* and other similar cases. The reason why *Aventis* is discussed here is that the Federal Circuit in *Trustees* picked up the *in haec verba* comment from *Aventis*.

Accordingly, returning to *Trustees of Columbia University v. Symantec Corp.*, Columbia had argued that the district court had departed from the “plain meaning” of certain phrases in the patents-in-suit. Columbia argued, according to the Federal Circuit, that “there is a heavy presumption that claim terms

carry their accustomed meaning in the relevant community at the relevant time” which can only be “overcome in only two circumstances: the patentee has expressly defined a term or has expressly disavowed the full scope of the claim,” citing *Thorner*. 811 F.3d at 1363.

The point being, Columbia was taking liberties with the Federal Circuit’s language in *Thorner*. The Federal Circuit in *Thorner* said, as noted above:

There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution. *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1580 (Fed.Cir.1996).

669 F.3d at 1365. The *Thorner* court did not use the word “expressly.” That was a word Columbia added.

The *Thorner* court did say that

To act as its own lexicographer, a patentee must “clearly set forth a definition of the disputed claim term” other than its plain and ordinary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed.Cir.2002). It is not enough for a patentee to simply disclose a single embodiment or use a word in the same manner in all embodiments, the patentee must “clearly express an intent” to redefine the term.

669 F.3d at 1365-66, and that:

The standard for disavowal of claim scope is similarly exacting. “Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question.” *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed.Cir. 2001).

669 F.3d at 1366.

Thus, the *Thorner* court, relying on prior precedent, explained that precedent set a relatively high bar for showing, *inter alia*, disavowal, but the court had not used the word “expressly” – which, again, Columbia had gratuitously added.

The Federal Circuit in *Trustees* responded that “[o]ur case law does not require explicit redefinition or disavowal,” 811 F.3d at 1363, citing *Aventis* for the proposition that “[t]his clear

expression need not be *in haec verba* but may be inferred from clear limiting descriptions of the invention in the specification or prosecution history.” *Id.* The Federal Circuit then explained that:

As our *en banc* opinion in *Phillips* made clear, “a claim term may be clearly redefined without an explicit statement of redefinition” and “[e]ven when guidance is not provided in explicit definitional format, the specification may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents.” 415 F.3d at 1320-21 (citing and quoting *Bell Atl. Network Servs., Inc. v. Covad Commc'ns Group, Inc.*, 262 F.3d 1258, 1268 (Fed.Cir.2001), and *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295, 1300 (Fed.Cir.2004)).

811 F.3d at 1364.

The portion of the *Phillips* opinion that the *Trustees* court was referring to related to a criticism of the Federal Circuit’s prior opinion in *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193 (Fed.Cir. 2002), in which the Federal Circuit had emphasized the use of dictionary definitions.

The rationale in *Texas Digital*, according to the *Phillips* court, was “an effort to combat what this court has termed ‘one of the cardinal sins of patent law—reading a limitation from the written description into the claims,’ *SciMed Life Sys.*, 242 F.3d at 1340.” 415 F.3d at 1320. The *Phillips* court wrote that “[a]lthough the concern expressed by the court in *Texas Digital* was valid, the methodology it adopted placed too much reliance on extrinsic sources such as dictionaries, treatises, and encyclopedias and too little on intrinsic sources, in particular the specification and prosecution history.” *Id.* The *Phillips* court then wrote, in the section referenced by the *Trustees* court:

Assigning such a limited role to the specification, and in particular requiring that any definition of claim language in the specification be express, is inconsistent with our rulings that the specification is “the single best guide to the meaning of a disputed term,” and that the specification “acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication.” *Vitronics*, 90 F.3d at 1582; *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295, 1300 (Fed.Cir.2004) (“Even when guidance is not provided in explicit definitional format, the specification may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents.”) (citations omitted); *Novartis Pharms. Corp. v. Abbott Labs.*, 375 F.3d 1328, 1334-35 (Fed.Cir.2004) (same); *Bell Atl. Network Servs., Inc. v. Covad Communications Group, Inc.*, 262 F.3d 1258, 1268 (Fed.Cir.2001) (“[A] claim term may be clearly redefined without an explicit statement of redefinition.”).

415 F.3d at 1320-21.

In a nutshell, to the extent that QSC suggests that the Federal Circuit in *Trustees* “lower the bar” to finding a disavowal of claim scope in either the specification or prosecution history, the Federal

Circuit plainly did not. Moreover, although the *Trustees* court rejected Columbia's argument that a patentee must have "expressly defined a term" or "expressly disavowed the full scope of the claim," relying on *Thorner*. 811 F.3d at 1363 (which the *Thorner* court did not say), and did so noting "[o]ur case law does not require explicit redefinition or disavowal," 811 F.3d at 1363, citing *Aventis* for the proposition that "[t]his clear expression need not be *in haec verba* but may be inferred from clear limiting descriptions of the invention in the specification or prosecution history," the *Trustees* court did not express "new" or "restated" law. As noted above, the *Aventis* court expressly cited and applied *Thorner*.

d) '542 Patent Specification

Further emphasizing what has already been discussed, in part, above, the term "easily" appears in the '542 patent specification three times. In the first appearance, the '542 patent specification says, in commenting on prior art amplifier 10 depicted in Fig. 3, that:

However, with this amplifier 10, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed. Although the user can change the signal processing function parameters as described above, it is often necessary or desirable to change the signal processing function or even combine several different signal processing functions in the signal processing circuit. This is not possible with conventional amplifiers.

'542 patent, col. 1, lines 58-65 (emphasis added). That does not support an "inference" of an intent to limit the claim language to require a limitation of "easily." That simply discusses a consequence of the prior art amplifier being discussed.

The second appearance of "easily" in the '542 patent specification is in the following context:

This diagnostic function is particularly important in emergency announcing systems having a plurality of loudspeakers and in systems where loudspeakers are remotely located and not easily tested for proper functioning.

'542 patent, col. 3, lines 46-49. That deals with an entirely different issue.

The third appearance of "easily" in the '542 patent specification, as already noted above, is:

The preferred embodiment of the present invention provides significant improvements and advantages because it allows one or more signal processing functions and signal processing function parameters to be easily and quickly programmed.

'542 patent, col. 3, lines 55-59. This is also the only time that "quickly" appears in the '542 patent specification.

The references in the '542 patent specification do not rise to that required under *Trustees*, *Thorner*, or any other cited decision for limiting the otherwise clear language of “capable of receiving and storing” to “capable of being easily and quickly changed or programmed” as QSC proposes. Those comments simply note disadvantages of the prior art, and a corresponding advantage of the preferred embodiment. While Federal Circuit case law may not require “explicit redefinition or disavowal,” per *Trustees*, nevertheless, plainly claims are not required to be construed to include every “advantage” of the preferred embodiment over the prior art described in the specification, as already noted above.

The Patent Act of 1836, ch. 357, 5 Stat. 117 (July 4, 1836), was the first to require “claims” *per se*. The Acts of 1790 and 1793 did not *per se* require claims. The Act of 1836, § 5, required:

Every such patent shall contain a short description or title of the invention or discovery, correctly indicating its nature and design, and in its terms grant to the applicant or applicants, his or their heirs, administrators, executors, or assigns, for a term not exceeding fourteen years, the full and exclusive right and liberty of making, using, and vending to others to be used, the said invention or discovery, referring to the specifications for the particulars thereof, a copy of which shall be annexed to the patent, specifying what the patentee claims as his invention or discovery. (emphasis added)

Over time, that evolved into current § 112(b), requiring:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

Yes, claims are “interpreted” in light of the specification of which they are a part, *Phillips*, 415 F.3d at 1313, but that does not equate to analytically or figuratively inserting “I claim” in front of the specification. As the Federal Circuit *en banc* in *Phillips* made clear, the distinction between permissibly “reading claims in light of the specification” and improperly “importing limitations from the specification into the claims” remains the law. 415 F.3d at 1323 (“One of the best ways to teach a person of ordinary skill in the art how to make and use the invention is to provide an example of how to practice the invention in a particular case. Much of the time, upon reading the specification in that context, it will become clear whether the patentee is setting out specific examples of the invention to accomplish those goals, or whether the patentee instead intends for the claims and the embodiments in the specification to be strictly coextensive. * * * The manner in which the patentee uses a term within the specification and claims usually will make the distinction apparent.”).

As noted above, the Federal Circuit has consistently held that descriptions of preferred embodiments – even if that is the only disclosed embodiment – do not, by that reason alone, constitute “claim limitations.” *Phillips*, 415 F.3d at 1323 (“For instance, although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments. * * * In particular, we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment. * * * That is not just because section 112 of the Patent Act requires that the claims themselves set forth the limits of the patent grant, but also because persons of ordinary skill in the art rarely would confine their definitions of terms to the exact representations depicted in the embodiments.”).

Additionally, as Crest points out, terms such as “easily” and “quickly” are subjective terms that could result in the claims “as construed,” but not “as drafted,” being held invalid under § 112(b) for failure to meet the statutory requirement of “particularly pointing out and distinctly claiming the subject matter.” See e.g., *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1350 (Fed. Cir. 2005)(“Datamize has offered no objective definition identifying a standard for determining when an interface screen is ‘aesthetically pleasing.’ In the absence of a workable objective standard, ‘aesthetically pleasing’ does not just include a subjective element, it is completely dependent on a person's subjective opinion.”). Here, although QSC advocates construing “capable of receiving and storing” in terms of “capable of being easily and quickly changed or programmed,” QSC offers no objective standard for “capable of being easily and quickly changed or programmed.”

e) Prosecution History

Turning to the prosecution history, in the applicant's response of July 18, 1995 (Amendment B) in response to the Office Action of February 14, 1996, the applicant first addressed "conventional amplifiers":

Conventional amplifiers having signal processing circuits are comprised of analog and digital components on a printed circuit board. The signal processing function parameters, for example, crossover frequency and amplitude, can be changed by adjusting control knobs provided on an amplifier housing which are operatively connected to the components of the signal processing circuit. Alternatively, the signal processing function parameters may be modified by signals input via a computer or similar device under program control.

Ex. D [Dkt. 191-4] CREST000507.

The applicant then discussed the problem with "conventional amplifiers":

However, with the conventional amplifiers as discussed above, the signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed. Although the user can change the signal processing function parameters as described above, it is often necessary or desirable to change the signal processing function or even combine several different signal processing functions in the signal processing circuit. This is not possible with conventional amplifiers.

Id. When the applicant urged that "with conventional amplifiers" the "signal processing function is fixed by the circuit design of the signal processing circuit and cannot be easily changed," the applicant was simply noting a consequence of the "conventional amplifiers." That does not rise to the level of a clear disavowal of claim scope, as required by *Trustees*, *Thorne*, and like cases.

In addition, the applicant amended application claim 1 to provide:

1. (Amended) An amplifier comprising:
 an amplifier housing;
 a power amplifier; and
 a digital signal processor [module] capable of
receiving and storing at least one of an algorithm which defines
at least one signal processing function and signal processing
function parameters,
the digital signal processor being connected to the
 power amplifier and located within the amplifier housing [for
 defining at least one signal processing function for the
 amplifier].

The applicant in arguing over the disclosure in the Van Hulle reference, urged, *inter alia*, as noted above:

Conversely, the novel combination of the present invention as recited in amended claim 1 requires an amplifier comprising a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters. Thus, the amplifier of the present invention can receive an algorithm which defines an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacture. In addition, the digital signal processor of the amplifier as claimed can receive signal processing function parameters if desired.

In context, the applicant emphasized, by the underlining, the claim language of amended claim 1, “capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameter.” The applicant followed that by “Thus,” clearly thereby communicating “as a result” or “as a consequence” of that amended claim language “the amplifier of the present invention can receive an algorithm which defines an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacturer.” And the applicant did so in the context arguing that the amended claims defined over the Van Hulle reference.

QSC urges that “[t]he applicant further specifically distinguished his ‘present invention’ from the Van Hulle reference by contending that, in Van Hulle, the signal processing function was ‘fixed on a circuit board.’ In contrast, according to the applicant, ‘the amplifier of the present invention can receive an algorithm which defines an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacture.’” QSC’s Resp. Brief [Dkt. 192] at 31. That much is true.

But then QSC urges that “[t]hus, the inventor repeatedly and explicitly touted the quick and easy programming of his amplifier as advantageous over the prior art.” *Id.* That is not true. What the applicant said *vis-à-vis* Van Hulle was that the “invention” did not require “the addition of any circuit components after manufacture.”

That is not to say that there is an absence of potential disavowal. However, neither QSC nor Crest have addressed the same.

In this instance, the applicant’s comments in urging patentability potentially constitute a clear statement to the “world” reviewing the ’542 patent, and its prosecution history, that the claim amendment of adding “capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameter” was intended to define, in the terms of the applicant’s argument, that “the amplifier of the present invention can receive an algorithm which defines an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacturer.”

Accordingly, there is a potential assertion (that QSC did not make) that having presented the foregoing comments *vis-à-vis* the terms of amended application claim 1, the applicant remains bound that representation. Furthermore, as discussed above in conjunction with the prosecution history, although the terms of application claim 1 were subsequently added to application dependent claim 4, the substance of the foregoing amendment was carried forward.

As a consequence, the phrase “capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,”

introduced in the applicant's response of July 18, 1995 (Amendment B) in response to the Office Action of February 14, 1996, and which now appears in claim 1 of the '542 patent:

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters (emphasis added)

is potentially limited by the applicant's comments above.

Namely, "capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters" could potentially be construed to mean, as the applicant advocated during prosecution, that "the amplifier of the present invention can receive an algorithm which defines 'an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacturer.'"

Unlike QSC's proposed construction that introduces the wholly subjective terms "quickly and easily," that likely would not meet the requirements of § 112(b) of "particularly pointing out and distinctly claiming the subject matter" which an applicant regards as the invention (for the reasons discussed above), whether an accused "amplifier" can "receive an algorithm which defines 'an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacturer,' " would seem, at least at first blush, to offer an objective standard. And, of course, that is what the applicant argued during prosecution.

Having said that, neither QSC nor Crest have advanced that construction. Mindful of the Federal Circuit holding that "[t]he duty of the trial judge is to determine the meaning of the claims at issue, and to instruct the jury accordingly. * * * In the exercise of that duty, the trial judge has an independent obligation to determine the meaning of the claims, notwithstanding the views asserted by the adversary parties," *Exxon Chemical Patents, Inc. v. Lubrizol Corp.*, 64 F.3d 1553, 1555 (Fed. Cir. 1995), the master nevertheless declines to make a recommendation that "capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters" means, as the applicant advocated during prosecution, that "the amplifier of the present invention can receive an algorithm which defines 'an entirely new signal processing function (or combination of functions) without requiring the addition of any circuit components after manufacturer.' " There are two reasons.

First, neither QSC nor Crest have advocated that construction, and thus neither party has had an opportunity to comment on that construction. Thus, the master declines to do so based on fundamental principles of due process.

Second, it is presently unknown whether such a construction would have any consequence on infringement and/or validity or other issues in this case. It is not the province of the federal courts to issue “advisory opinions.”

If one or more of the parties choose to file objections to this Report and Recommendation, the parties may request that the Court remand this issue to the master for further briefing and decision.

4. Recommendation

For the foregoing reasons, the master recommends that the Court conclude that “capable of receiving and storing” in the limitation “a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters” does not require construction, in accordance with the foregoing.

In order to avoid a potential problem under *O2 Micro*, 521 F.3d at 1360 (“When the parties raise an actual dispute regarding the proper scope of these claims, the court, not the jury, must resolve that dispute.”), the master recommends that the Court instruct the parties that they may not urge conflicting “constructions” to the jury contrary to the foregoing. In particular, the master recommends that the Court instruct QSC that it may not argue its proposed construction, “capable of being easily and quickly changed or programmed” and instruct Crest that it may not argue its proposed construction of “able to acquire or reserve for future use” to the jury.

If that creates an “issue” for the parties, the master recommends that the Court order supplemental claim construction on this issue, either before the Court or the master.

E. “performance characteristics of the power amplifier”

The parties’ proposed the following contested constructions:

Claim Nos.	Crest’s Proposed Construction	QSC’s Proposed Construction
’542 patent, cls. 1 and 4	No construction needed. Otherwise: “data relating to attributes or qualities of how the power amplifier is behaving when amplifying signals”	“Attributes or qualities of how the power amplifier is behaving when amplifying signals. This construction requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.”
AJCCS [Dkt. 184] at 7, Crest’s Op. Brief [Dkt. 191] at 23, QSC’s Resp. Brief [Dkt. 192] at. 34		

1. Disputed Phrase in Context

Claims 1 and 4 of the ’542 patent provide:

1. An amplifier comprising:

a power amplifier; and

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

4. The amplifier of claim 1, wherein the input/output port of the digital signal processor is operatively connected to a first digital to analog converter for transmitting the control signals for modifying the performance of the power amplifier and a second analog to digital converter for receiving the performance characteristics of the power amplifier. (emphasis added)

2. The Parties' Arguments

a) Crest's Opening Brief

Crest urges that no construction is necessary, but if construed, the “ordinary meaning” may be determined by combining the ordinary meaning of “performance,” “characteristic,” and “power amplifier.” Crest’s Op. Brief [Dkt. 191] at 23.

Relying on a declaration by Mr. Pirkle, Crest’s expert, Crest urges that the ordinary meaning of “performance” is “an active action or operation,” and that in the context of the claims, the “active operation” of a power amplifier is “amplifying signals.” Crest, again relying on a declaration by Mr. Pirkle, urges that the ordinary meaning of “characteristics” is “behavior, attributes, or qualifies.” Consequently, Crest says, “the ordinary meaning of the phrase ‘performance characteristics of the power amplifier’ clearly includes the notion of data ‘relating to attributes or qualities of how the power amplifier is behaving when amplifying signals.’ ” *Id.*

Crest urges that the specification supports that meaning because the ordinary meaning of “performance characteristics of the power amplifier” includes “observation of how the amplifier is ‘behaving when amplifying signals.’ ” *Id.* Crest points to the specification of the ’542 patent stating that a “digital signal processor 250 can receive and monitor the performance characteristics of the power amplifier 260.” *Id.* at 23-24, quoting ’542 patent, col. 5, lines 45-46. In context, that is referring to Fig. 2:

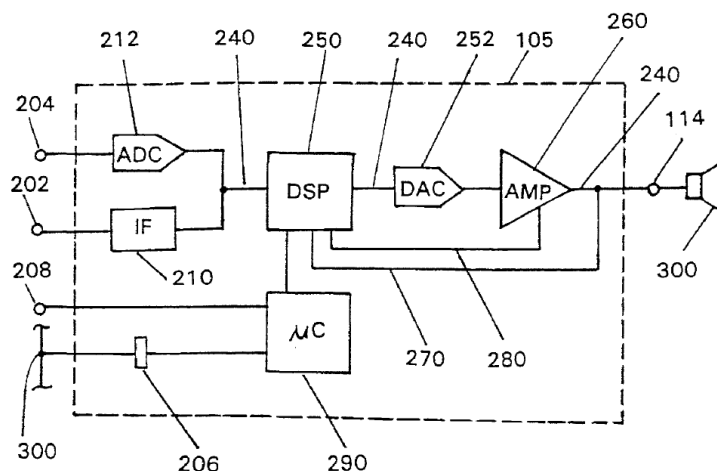


FIG. 2

Crest also points to the same portion of the specification providing that “[i]f the performance characteristics of the amplifier 260 are unacceptable, the digital signal processor 250 can send a control signal via the signal path 280 for modifying the amplifier performance.” *Id.* at 24, quoting ’542 patent, col. 5, lines 47-51.

“Thus,” Crest says, “the fact that the performance characteristics are monitored by a digital signal processor supports the view that the performance characteristics relate to how the power amplifier is behaving when amplifying signals.” *Id.* at 24. Crest urges that “[e]ven further, when read in the context of the claims, control signals are used ‘for modifying the performance of the power amplifier.’ ” *Id.*

Crest urges that “in context of the claims and specification, the performance characteristics relate to how the power amplifier is behaving when amplifying signals. Performance implicates action, or activity, which, in this instance, is the normal operation of the power amplifier being monitored. Therefore, in addition to the ordinary meaning, the specification confirms that ‘performance characteristics’ relate to real-time behavior of the power amplifier during its normal operation of amplifying audio signals.” *Id.* at 24, citing ’542 patent, col. 4, lines 7-12.

As an example, Crest points to the ’542 patent, col. 5, lines 56-57, providing “[t]he signal path 270 includes a current detector and a voltage detector (not shown) described in U.S. patent application Ser. No. 08/558.386. described above.” Crest says that “[i]n this example, receiving these performance characteristics data enables the digital signal processor to prevent malfunction of the power amplifier and/or the load (loudspeaker).” *Id.* at 24.

With respect to QSC’s proposed construction, Crest voices two criticisms. First, Crest says, “Defendant’s construction omits the ‘data relating to’ portion of Crest Audio’s construction.” Crest’s Op. Brief [Dkt. 191] at 24. Crest urges that “the ‘data relating to’ portion is clearly inherent from the context of claim 1. Claim 1 recites that the DSP has an ‘input/output port for receiving the performance characteristics of the power amplifier,’ and one of ordinary skill in the art would immediately know that the performance characteristics necessarily must be communicated as some sort of corresponding data component in order to be understandable and usable by the DSP circuit.” *Id.* at 24-25, pointing to claim 1.

Crest urges that “[s]econd, Defendant’s proffered construction ‘requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.’ ”

Id. at 25. Crest says that “[t]his additional statement makes no sense and actually makes the meaning of this term less clear. The clear flaw with this portion of Defendant’s construction is that the claim term at issue is a noun phrase, but Defendant seeks to define the noun phrase by requiring the performance of an action. It makes no sense to define a noun phrase, or thing, in terms of an action. It is completely unclear how the performance characteristics of the power amplifier ‘change the actual behavior of the amplifier,’ since the characteristics merely involve ‘data relating to the attributes or qualities of how the power amplifier is behaving when amplifying signals.’ Accordingly, Defendant’s construction is incorrect, and the Court should adopt Crest Audio’s construction.” *Id.*

b) QSC’s Responsive Brief

As noted above, QSC filed a petition for *inter partes* review (IPR) of the ’542 patent. The Patent Trial and Appeal Board (PTAB), in an institution decision dated May 2, 2014, Ex. C to QSC’s brief [Dkt. 192-3], instituted review of claims 5 and 13, but denied review of claims 1-4 and 6-12.

QSC relies heavily on comments made by the PTAB in that institutional decision. Crest, in its reply brief (discussed below) urges that reliance is misplaced because the PTAB was discussing a different limitation.

(1) Background

Again, in terms of claim 1, the currently disputed phrase is “performance characteristics of the power amplifier” as shown by single underlying below:

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

The PTAB, on the other hand, was specifically focusing on the “transmitting control signals” limitation, shown in bold below:

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for **transmitting control signals for modifying the performance of the power amplifier.**

But, as discussed below, the PTAB's institution decision is a bit confusing. Given the parties' dispute, the PTAB's institution decision will be set out in full.

The PTAB first noted that:

Petitioner [QSC] argues that the phrase transmitting control signals for modifying the performance characteristics of the amplifier "should be interpreted in the manner suggested by the Patent Owner [Crest] in the corresponding litigation [, specifically] 'electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals'" Pet. 13-14. For the purpose of this decision, we agree this construction is the broadest reasonable interpretation.

Ex. C [Dkt. 192-3] at 8-9. It seems plain that the PTAB was referring to the "transmitting control signals for modifying the performance of the power amplifier" limitation, and agreed with QSC that Crest's proposed construction of "electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals" was the broadest reasonable interpretation.

That is also confirmed by the record in this cause. On August 30, 2013, Crest and QSC filed a "Joint Claim Construction and Prehearing Statement" ("JCCPS") [Dkt. 75], setting out the parties' proposed constructions for several disputed terms and phrases.

Two of those disputed terms and phrases were (1) "performance characteristics of the power amplifier" and (2) "transmitting control signals for modifying the performance of the power amplifier."

The parties in their JCCPS [Dkt. 75] treated those phrases separately. The parties proposed the following:

<u>Claim Term</u>	<u>Plaintiff's Proposed Claim Construction</u>	<u>Defendant's Proposed Claim Construction</u>
"performance characteristics of the power amplifier"	Does not need construction; bears ordinary meaning, which is: "data relating to attributes or qualities of how the power is behaving when amplifying signals"	"various performance limits, as opposed to states, of the amplifier circuitry, as determined by physical properties such as power supply voltage, maximum output device currents, bias levels, switching frequencies, switching dead time, internal loop gain, and closed-loop audio gain"
"transmitting control signals for modifying the performance of the power amplifier"	Does not need construction; bears ordinary meaning, which is: "electronic communication for adjusting the manner of how the	"transmitting control signals to modify various performance limits, as opposed to states, of the amplifier circuitry, by changing physical properties such as power

<u>Claim Term</u>	<u>Plaintiff's Proposed Claim Construction</u>	<u>Defendant's Proposed Claim Construction</u>
	power amplifier is behaving when amplifying signals”	supply voltage, maximum output device currents, bias levels, switching frequencies, switching dead time, internal loop gain, and closed-loop audio gain”

[Dkt. 75] at 5-6. Later, on May 14, 2014, two days after the PTAB’s institution decision, QSC moved the Court to stay the litigation pending the outcome of the IPR. [Dkt. 134] The Court did so on June 5, 2014. [Dkt. 147]

The PTAB, in its institution decision above, referred to the Patent Owner’s, *i.e.*, Crest’s, proposed construction in the “corresponding litigation.” That is a reference to this case. [Dkt. 192-3] at 2.

The PTAB also identified that proposed construction as “electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals,” namely the construction Crest proposed for the “transmitting control signals for modifying the performance of the power amplifier” limitation in the JCCPS [Dkt. 75]. As noted above, in connection with the “performance characteristics of the power amplifier” limitation, Crest had proposed “data relating to attributes or qualities of how the power is behaving when amplifying signals,” namely the same construction Crest advances here.

However, the PTAB appears to have conflated the two different limitations. Namely, in the heading to this portion of the PTAB’s decision, the PTAB wrote:

2. transmitting control signals for modifying the performance characteristics of the amplifier (claims 1-12)

But that is not an actual limitation in the claims. Also, the PTAB, in the foregoing portion of its decision, refers to:

Petitioner [QSC] argues that the phrase transmitting control signals for modifying the performance characteristics of the amplifier * * *.

Ex. C [Dkt. 192-3] at 8 (emphasis added). But, again, “transmitting control signals for modifying the performance characteristics of the amplifier” is not a limitation in the claims.

Again, as written, claim 1 provides that “the digital signal processor being connected to the power amplifier,” or, more colloquially, that the DSP is connected to the power amplifier.

Claim 1 secondly provides that “the digital signal processor * * * and having a first input,” or, again more colloquially, that the DSP, in addition to being connected to the power amplifier, has a “first input.”

Claim 1 then specifies a function for that “first input,” namely (1) “for receiving at least one of the algorithm and signal processing function parameters.”

Claim 1 thirdly provides that “the digital signal processor * * * and having a first input * * * and an input/output port,” or, once again, more colloquially, that the DSP, in addition to the power amplifier, has both a “first input,” as noted above, and an “input/output port.”

Claim 1 then specifies two functions for that “input/output port,” namely (1) “for receiving performance characteristics of the power amplifier” (which function includes the currently disputed phrase), and (2) “for transmitting control signals,” and then provides that those control signals are “for modifying the performance of the power amplifier” (which does not include the currently disputed phrase). Namely, the second “transmitting control signals” function speaks in terms of “modifying the performance” of the power amplifier, whereas the first “receiving” limitation speaks in terms of receiving “performance characteristics of the power amplifier” – the currently disputed phrase.

Dependent claim 4:

4. The amplifier of claim 1, wherein the input/output port of the digital signal processor is operatively connected to a first digital to analog converter for transmitting the control signals for modifying the performance of the power amplifier and a second analog to digital converter for receiving the performance characteristics of the power amplifier. (emphasis added)

continues that distinction.

Namely, dependent claim 4 says that the “input/output port” is “operatively connected” to a “first digital to analog converter” and a “second analog to digital converter.” Dependent claim 4 says that the function of the “first digital to analog converter” is “for transmitting the control signals for modifying the performance of the power amplifier,” namely the limitation that does not contain the currently disputed phrase. On the other hand, dependent claim 4 says that the function of the “second

analog to digital converter” is “for receiving the performance characteristics of the power amplifier,” namely the limitation that does contain the currently disputed phrase.

With that context, the PTAB next wrote:

In applying this construction, however, Petitioner appears to suggest that modifying the input signal to avoid particular behaviors of the amplifier is an example of adjusting the manner of how the power amplifier is behaving. See Pet. 26 and 28.

Ex. C [Dkt. 192-3] at 9 (emphasis by PTAB). The PTAB disagreed: “We disagree with how Petitioner interprets the input signal modification.” *Id.*

The PTAB reasoned:

As an example of modifying the performance characteristics of the amplifier, the Specification discloses that “the digital signal processor 250 may switch or modulate the power supply voltages to improve amplifier efficiency and sonic quality.” Ex. 1001, col. 7, ll. 22-24.

Id.

The PTAB added that:

The Specification also discloses that “[t]he digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300 and to increase the performance efficiency of the amplifier 100.” *Id.* at col. 5, ll. 51-55.

Id.

The PTAB noted that:

We note that in this quotation the functions of the amplifier are adjusted, not simply the input to the amplifier. In other words, the functions of the amplifier (power supply) itself, such as the voltage, are adjusted.

Id.

The PTAB concluded that:

Therefore, the broadest reasonable interpretation of “transmitting control signals for modifying the performance characteristics of the amplifier,” consistent with the Specification, requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.

Id. But, again, the PTAB, in referring to “transmitting control signals for modifying the performance characteristics of the amplifier” (a limitation that does not *per se* exist in the claims of the ’542 patent – or, indeed, *per se* exist anywhere in the ’542 patent, including the specification) appears to be conflating (1) “for receiving performance characteristics of the power amplifier” (the limitation containing the currently disputed phrase) and (2) “for transmitting control signals for modifying the performance of the power amplifier” (a limitation that does not contain the currently disputed phrase).

Yes, both functions are attributed to the claimed “input/output port,” but, as dependent claim 4 makes clear, the “transmitting” function is attributed to a “first digital to analog converter” that is “operatively connected” to the “input/output port,” and the “receiving” function is attributed to a “second analog to digital converter” that is also “operatively connected” to the “input/output port.” Also, of course, as noted above, the parties in the JCCPS [Dkt. 75] addressed the currently disputed phrase “performance characteristics of the power amplifier” in the “receiving” limitation separate from the “transmitting” limitation.

(2) QSC’s Contentions

QSC urges that “[t]he PTAB determined the broadest reasonable interpretation for this term is ‘attributes or qualities of how the power amplifier is behaving when amplifying signals,’ which was Crest’s proposed construction.” QSC’s Resp. Brief [Dkt. 192] at 34.

QSC further urges that “[t]he PTAB also provided important guidance as to what this construction means and how to apply it. More specifically, the PTAB limited its construction to ‘an actual behavior of the amplifier,’ and declined to extend it to ‘simply avoiding an input that causes certain behavior of the amplifier.” *Id.* citing to that portion of the PTAB decision above bridging pages 8-9, namely:

Petitioner [QSC] argues that the phrase transmitting control signals for modifying the performance characteristics of the amplifier “should be interpreted in the manner suggested by the Patent Owner [Crest] in the corresponding litigation [, specifically] ‘electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals’” Pet. 13-14. For the purpose of this decision, we agree this construction is the broadest reasonable interpretation.

Ex. C [Dkt. 192-3] at 8-9. QSC urges that it “proposes that the Court adopt the PTAB’s construction, including its understanding of what the construction means.” QSC’s Resp. Brief [Dkt. 192] at 34.

QSC then discusses the “broadest reasonable interpretation standard” used by the PTAB during IPRs, as contrasted with the *Phillips* standard used during district court litigation. QSC emphasizes that “the broadest reasonable interpretation sets the outer boundaries for how broad a construction can be,” and that “while a District Court can impose a different construction than the experts at the PTAB, it is a good indicator that the District Court’s construction is wrong if it is broader than the PTAB’s broadest reasonable interpretation.” *Id.* at 35 (emphasis by QSC).

QSC gives the example: “For instance, if the PTAB entered a construction on the hypothetical claim term ‘pencil’ that required the device be cylindrical and contain lead, a District Court construction that required the device only to be cylindrical is likely to be wrong—such a construction would be broader than the broadest reasonable interpretation. Yet, that is exactly what Crest asks the Court to do here—broaden the claims beyond what the PTAB believed was the broadest reasonable interpretation.” *Id.*

QSC also argues that the PTAB’s construction was “compelled by the intrinsic evidence.” *Id.* QSC says that “the PTAB based its construction for ‘performance characteristics of the amplifier’ on the specification, and explained its reasoning for requiring ‘performance characteristics’ to be limited to the actual attributes or qualities of the power amplifier when it is amplifying audio signals.” *Id.*

QSC says that “[t]he PTAB noted that the specification gives examples of what it means to modify performance characteristics. For instance, ‘[a]s an example of modifying the performance characteristics of the amplifier, the Specification discloses that ‘the digital signal processor 250 may switch or modulate the power supply voltages to improve amplifier efficiency and sonic quality.’ ” *Id.* at 35-36, citing the PTAB’s decision at 9, quoting the ’542 patent, col. 7, lines 22-24.

QSC urges that “[t]he PTAB also noted that the specification described the DSP as modifying performance characteristics by ‘control[ling] power supply or amplifier circuit functions * * *’—not by merely avoiding an input such as by turning down the volume to avoid distortion.” *Id.* at 36, citing the PTAB’s decision at 9, quoting the ’542 patent, col. 5, lines 51-55.

According to QSC, “[t]he PTAB thus specifically found that to modify the performance characteristics of the amplifier, the system must modify the actual functioning of the amplifier: ‘[T]he functions of the amplifier [must be] adjusted, not simply the input to the amplifier ... In other words, the functions of the amplifier (power supply) itself, such as the voltage are adjusted.’ ” *Id.* at 36.

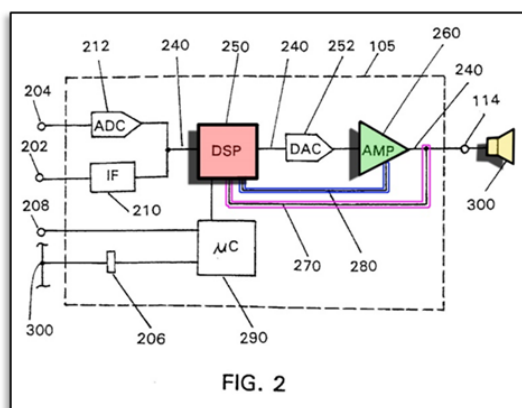
QSC urges that “[b]ased on the specification, the PTAB concluded that ‘the broadest reasonable interpretation of “transmitting control signals for modifying the performance characteristics of the amplifier,” consistent with the Specification, requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.’” *Id.*

QSC concludes that “[i]n short, ‘performance characteristics’ concern the actual behavior of the amplifier, not data that is related to that behavior, as in Crest’s construction.” *Id.*

QSC further Crest’s proposed construction impermissibly broadens the claims. QSC contend that “Crest seeks a construction that is much broader than the PTAB’s broadest reasonable interpretation. Crest seeks to enlarge the claims from ‘attributes or qualities of how the power amplifier is behaving when amplifying signals’ to ‘data relating to attributes or qualities of how the power amplifier is behaving when amplifying signals.’ Crest’s construction should be rejected.” *Id.* at 36-37.

In particular, QSC urges that “Crest contends that ‘data relating to’ ‘is clearly inherent from the context of claim 1.’” *Id.* at 37. QSC says that “‘data relating to’ does not appear in the specification, the claims, or the file history. Moreover, Crest’s basis for ‘data relating to’ relies on a misunderstanding of the ’542 patent’s specification.” *Id.* at 37.

QSC says, referring to Fig. 2 of the ’542 patent (as annotated in QSC’s brief):



that “[s]pecifically, Crest contends that ‘the current and voltage sent through the amplifier,’ which are read by line 270 (shown in purple to the right), are performance characteristics because this ‘data’ relates to performance of the amplifier. But the specification distinguishes between ‘performance characteristics’ and ‘load characteristics.’” QSC points to the ’542 patent, col. 5, lines 37-40 and 45-

57 (“Through the power supply control signal path 280, the digital signal processor 250 can receive and monitor the performance characteristics of the power amplifier 260.”). *Id.* at 37, n. 125.

QSC urges that “[a]s the specification puts it, line 270 detects ‘load characteristics’ while a different line, line 280 (shown in blue to the right), monitors and controls ‘amplifier performance.’” *Id.* citing ’542 patent, col. 5, lines 137-40, and 45-47. QSC contends that “[s]o, while the specification differentiates the various ‘characteristics,’ Crest conflates them.” *Id.*

QSC further urges that “[a]side from not being justified by the intrinsic evidence and being broader than the broadest reasonable interpretation, Crest’s construction fails for an additional reason. The phrase ‘data relating to’ is vague and unhelpful as it has no grounding in the patent itself. Thus, the construction leaves basic questions unanswered—and unanswerable. For instance, how ‘related’ does the data need to be to constitute ‘data related to’ performance characteristics? Crest’s construction serves only to confuse, not clarify, and must be rejected.” *Id.* at 37-38.

c) Crest’s Reply

Crest dismisses the PTAB’s decision saying “QSC apparently hopes that the Court does not actually read the IPR institution decision, because it is indisputable that the PTAB did not construe the term ‘performance characteristics of the power amplifier.’ * * * Instead, the PTAB construed the phrase ‘transmitting control signals for modifying the performance characteristics of the amplifier,’ which is a completely different phrase being separately construed by the parties in this proceeding. * * * Accordingly, all of QSC’s arguments regarding the PTAB’s institution decision with respect to the phrase ‘performance characteristics of the power amplifier’ are misplaced.” Crest’s Reply [Dkt. 193] at 14.

Crest responds to QSC’s criticism that Crest’s proposed construction attempts to broaden the claim language: “QSC also argues that Crest is attempting to broaden this term because its proposed construction is ‘*data relating to* attributes or qualities of how the power amplifier is behaving when amplifying signals.’ Dkt. 192, p. 37 (emphasis in original). However, Crest is not attempting to broaden the term’s scope because Crest’s position is that this term does not need construction. *See* Dkt. 184 (Amended Joint Claim Construction Statement).” Crest’s Reply [Dkt. 193] at 15.

Crest, nevertheless adds that: “Nonetheless, if the Court does decide to construe this term, the ‘data relating to’ portion of Crest’s proposed construction is clearly inherent in the context of claim 1 because the claim recites that the DSP has an ‘input/output port for receiving the performance

characteristics of the power amplifier.’ As such, the performance characteristics would necessarily be communicated as some sort of corresponding data component in order to be usable by the DSP circuit, as one of ordinary skill in the art (or practically anyone familiar with electronic circuitry) would know. Crest discussed this point in its opening brief, but QSC does not respond. See Dkt. 191, pp. 24-25. Therefore, if the Court decides to construe this term, Crest’s proposed construction is proper.”
Id.

d) Parties’ Presentation Slides

The parties presented the follow slides during the claim construction hearing.

QSC’s Presentation Slides

“performance characteristics of the power amplifier”

QSC’s Proposed Construction	Crest’s Proposed Construction
“attributes or qualities of how the power amplifier is behaving when amplifying signals. This construction requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.”	“data relating to attributes or qualities of how the power amplifier is behaving when amplifying signals”

This construction necessarily construes both “transmitting . . .” and performance characteristics

2. transmitting control signals for modifying the performance characteristics of the amplifier (claims 1-12)

Petitioner argues that the phrase transmitting control signals for modifying the performance characteristics of the amplifier “should be interpreted in the manner suggested by the Patent Owner in the corresponding litigation [specifically] ‘electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals’” Pet. 13-14. For the purpose of this decision, we agree this construction is the broadest reasonable interpretation.

QSC Ex. C at 8-9

In applying this construction, however, Petitioner appears to suggest that modifying the input signal to avoid particular behaviors of the amplifier is an example of adjusting the manner of how the power amplifier is behaving.

26 and 28. We disagree with how Petitioner interprets the input signal modification. As an example of modifying the performance characteristics of the amplifier, the Specification discloses that “the digital signal processor 250 may switch or modulate the power supply voltages to improve amplifier efficiency and some quality.” Ex. 1001, col. 7, ll. 22-24. The Specification also discloses that “[t]he digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier and to increase the performance efficiency of the amplifier.” Ex. 1001, col. 5, ll. 51-55. We note that in this quotation the functions of the amplifier are adjusted, not simply the input to the amplifier. In other words, the functions of the amplifier (power supply) itself, such as the voltage, are adjusted. Therefore, the broadest reasonable interpretation of “transmitting control signals for modifying the performance characteristics of the amplifier,” consistent with the Specification, requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.

QSC Ex. C at 9

Performance characteristics

“Data related to . . .”

~~Specification~~

~~File History~~

63

QSC's Presentation Slides

Performance characteristics are not load characteristics

The main signal path 240 is connected to at least two additional signal paths 270, 280 for detecting load characteristics and monitoring and controlling amplifier performance, respectively. More specifically, the power supply control signal path 260 is connected between the power amplifier 260 and the digital signal processor 250 and includes a digital/analog converter and an analog/digital converter (not shown) for allowing transfer of signals therebetween. Through the power supply control signal path 260, the digital signal processor 250 can receive and monitor the performance characteristics of the power amplifier 260. If the performance characteristics of the amplifier 260 are unacceptable, the digital signal processor 250 can send a control signal via the signal path 290 for modifying the amplifier performance. The digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300 and to increase the performance efficiency of the amplifier 100.

344 patent at 9:27-33

"Performance characteristics" on 280

FIG. 2

"Load characteristics" on 270

And load characteristics are not performance characteristics

The signal path 270 includes a current detector and a voltage detector (not shown) described in U.S. patent application Ser. No. 05/558,386, described above. The current detector and voltage detector detect a current and voltage sent through the amplifier 260. The detected current and voltage are sent via the signal path 270 to the digital signal processor 250 where an impedance of the load 300 and an amount of power supplied to the load 300 by the amplifier 260 is calculated. The digital signal processor 250 can then monitor the load impedance and power supply as a safety and diagnostic function to prevent malfunction of and damage to the load 300 or the amplifier 260.

344 patent at 9:34-41

"Performance characteristics" on 280

FIG. 2

"Load characteristics" on 270

Crest's construction confuses the two

As examples of such behavior, the specification of the '542 patent indicates that the digital signal processor can monitor the current and voltage sent through the amplifier. *See id.* at Col. 5, lines 56-67. In this example, receiving these performance characteristics data enables the digital signal processor to prevent malfunction of the power amplifier and/or the load (loudspeaker). *See id.*

Crest Opening Brief at 44

Crest's Presentation Slides

Claim phrase:
"performance characteristics of a power amplifier"

Crest Audio's Proposed Interpretation	QSC's Proposed Interpretation
No construction needed.	"Attributes or qualities of how the power amplifier is behaving when amplifying signals. This construction requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier."
Otherwise: "data relating to attributes or qualities of how the power amplifier is behaving when amplifying signals"	

QSC Mischaracterizes PTAB

- QSC Claims PTAB determined BRI for this claim phrase
 - See Doc. 192 at 34.
- PTAB did NOT construe this claim phrase
 - See Doc. 192-3 at 7-10.

Therefore, no construction needed.

3. Discussion

First, given the parties dispute, choosing "no construction is needed" is not an option.

Second, the PTAB's decision is neither controlling nor helpful for several reasons. One is that this was a decision whether to "institute" *inter partes* review under 35 U.S.C. § 314, as opposed to a "final written decision" under § 318. The PTAB's "final written decision," [Dkt. 152-1] dated April 29, 2015, does not refer to or incorporate this portion of the PTAB's institution decision.

Yes, some district courts have referenced PTAB “institution” decisions in deciding claim construction issues (as QSC notes in connection with the subsequent disputed phrase), and taking guidance from a PTAB decision, even as an “institution” decision, is not foreclosed in appropriate cases. However, clearly PTAB “institution” decisions are not “binding” on this Court, and as “informational” are necessarily considered in the context in which those decisions are made in particular cases.

Under the procedure for seeking *inter partes* review, a petition for *inter partes* review is first filed under 35 U.S.C. § 312, and accompanying PTO regulations. The patent owner is then permitted, but not required, to file a response under § 313. The PTAB then decides, with or without a patent owner’s statement, whether to grant *inter partes* review under the provisions of § 314. If the decision is to grant all or a portion of the petition, then the proceedings turn to a “trial” under § 316, and ultimately a “final written decision” by the PTAB under § 318.

Those proceedings are public, and the record of those proceedings are available through the PTO’s website, www.uspto.gov. In the IPR for the ’542 patent, those proceedings are available by searching for IPR2014-00129.

In this instance, QSC filed a petition seeking *inter partes* review of the ’542 patent, but the Patent Owner, Crest Audio, Inc., did not file a Patent Owner’s statement. Thus, at the time that the PTAB issued its institution decision, the PTAB only had QSC’s petition.

As noted above, the PTAB conflated the two separate limitations (1) “for receiving performance characteristics of the power amplifier” (the limitation containing the currently disputed phrase) and (2) “for transmitting control signals for modifying the performance of the power amplifier” (a limitation that does not contain the currently disputed phrase), into “transmitting control signals for modifying the performance characteristics of the amplifier” (a limitation that does not *per se* exist in the claims of the ’542 patent – or, indeed, *per se* exist anywhere in the ’542 patent, including the specification).

That error can be traced to QSC’s petition. In its petition, QSC, under the heading “V. Claim Construction 37 C.F.R. § 42.104(b)(3),” urged that “[f]or the purposes of this *Inter Partes* Review, the phrase ‘transmitting control signals for modifying the performance characteristics of the amplifier’ as recited in claim 1 should be interpreted in the manner suggested by the Patent Owner in the corresponding litigation. The Patent Owner is proposing that the phrase be interpreted as ‘electronic

communication for adjusting the manner of how the power amplifier is behaving when amplifying signals’ citing at least Ex. 1001 7:28-32 (“The digital signal processor 250 can automatically control signal processing functions and parameters in response to the calculated load impedance and power supply.”). *See* Ex. 1013, page 6 discussed below.” QSC’s Petition in IPR2014-00129.

By way of explanation, Ex. 1001 was the ’542 patent and Ex. 1013 was the JCCPS [Dkt. 75] previously filed in this case and discussed above.

Thus, in its petition, QSC conflated the two limitations as “transmitting control signals for modifying the performance characteristics of the amplifier” and the PTAB, apparently, did not consult the claim closely enough to discover the error. However, QSC referred to the Patent Owner’s (Crest’s) prior proposed construction of “electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals” which is the construction Crest proposed in Dkt. 75 for “transmitting control signals for modifying the performance of the power amplifier.” Crest did not propose that construction for the “performance characteristics of the power amplifier” limitation – namely the one currently under discussion.

QSC’s argument, as reflected in its foregoing slides, that the PTAB was actually construing both limitations is simply wrong. In the institution decision, the PTAB wrote that “Petitioner appears to suggest that modifying the input signal to avoid particular behaviors of the amplifier is an example of adjusting the manner of how the power amplifier is behaving. *See* Pet. 26 and 28.” [Dkt. 192-3] at 9.

In the portion of QSC’s petition that the PTAB was referencing, QSC urged that claim 1 was unpatentable over a Porambo reference in view of a Black reference. QSC said that “Black discloses an amplifier with an output protection circuit that includes a DSP.” QSC’s Petition at 26. QSC also urged that “Porambo uses a DSP to reduce clipping in the amplifier and therefore reduce distortion. Black uses a DSP to reduce saturation (also a form of distortion) of the power amplifier and increase its efficiency.” *Id.*

QSC contended that a “person of ordinary skill in the art would have been motivated to combine the teachings of Porambo with those of Black as a way to control distortion in the power amplifier and provide output protection for the power amplifier stage. In addition, a person of ordinary skill in the art would have considered it obvious to have the DSP of Porambo receive the performance characteristics of the power amplifier and transmit control signals that modify the

performance characteristics as taught by Black as a way to use a single DSP in the amplifier to perform both signal processing and output protection functions rather than having to have separate DSPs to perform these functions.” *Id.* at 26-28. QSC then presented a claim chart that grouped the “receiving performance characteristics” and “transmitting control signals” limitations together as part of the “input/output port” limitation. *Id.* at 28.

The PTAB, in its institution decision addressing that argument, wrote: “Claim 1 recites ‘transmitting control signals for modifying the performance characteristics of the amplifier.’ ” [Dkt. 192-3] at 10. But, as noted repeatedly above, claim 1 has no such limitation.

The PTAB then wrote “Petitioner asserts that Porambo’s transmission of modified testing signals meets this limitation. Pet. 25-26.” *Id.* The PTAB wrote that “We disagree. As noted above, our construction requires the control signal to modify a performance characteristic of the amplifier itself.” But, of course, the PTAB reached that conclusion on a conflation of separate limitations. The PTAB then concluded that “Petitioner has not shown sufficiently that Porambo discloses ‘transmitting control signals for modifying the performance characteristics of the amplifier,’ as required by claim 1.” *Id.* at 10-11. The PTAB reached the same conclusion *vis-à-vis* a combination of Porambo and Black: “Petitioner has not shown sufficiently that Porambo and Black teach or suggest ‘transmitting control signals for modifying the performance characteristics of the amplifier,’ as required by claim 1.” *Id.* at 12.

Bottom line, QSC’s IPR petition erred in representing to the PTAB that “transmitting control signals for modifying the performance characteristics of the amplifier” was a limitation of claim 1. It was not.

QSC also erred in representing to the PTAB that Crest as proposed construing that phrase as “electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals.” Rather, Crest had proposed that construction for “transmitting control signals for modifying the performance of the power amplifier” – a limitation that does not include the disputed phrase “performance characteristics of the power amplifier.”

The PTAB’s decision, based on QSC’s erroneous representations, and without any input from Crest, simply cannot be accorded deference.

Nor is it any answer that both functions are attributed to the “input/output port” as represented below by the language of claim 1 with paragraphing added:

an input/output port
for receiving performance characteristics of the power amplifier and
for transmitting control signals for modifying the performance of the power amplifier.

The “receiving performance characteristics” and “transmitting control signals” limitations are (1) separate limitations, and (2) have been treated by the parties as separate limitations having different constructions at least since the filing of the parties’ JCCPS [Dkt. 75] on August 30, 2013.

But that also points out a problem with the parties’ proposed constructions. The entire claim limitation, once again, is:

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

Parsing that limitation:

the digital signal processor
being connected to the power amplifier and
having a first input
for receiving at least one of the algorithm and signal processing function parameters and
an input/output port
for receiving performance characteristics of the power amplifier and
for transmitting control signals for modifying the performance of the power amplifier.

and recognizing that this is an apparatus claim, not a method claim, the “structure” the claim calls for is simply “an input/output port.” It is possible, of course, that functional statements can be structurally limiting.

But here, neither Crest’s nor QSC’s proposed constructions are structurally limiting. Crest urges that “receiving performance characteristics” means “data relating to attributes or qualities of how the power amplifier is behaving when amplifying signals,” but that does not provide any “structural” limitation on “an input/output port,” at least none that Crest identifies. QSC urges that “receiving performance characteristics” means “[a]ttributes or qualities of how the power amplifier is

behaving when amplifying signals. This construction requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.” Similarly, that also does not provide any “structural” limitation “an input/output port.” QSC’s requirement of “changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier” may have something to do with the actual signals being transmitted, but says nothing about the physical structure of the “input/output port” – at least not in any way QSC has described.

Thus, it is not readily apparent why the parties dispute the meaning of “receiving performance characteristics, or in the broader context of “digital signal processor * * * having * * * an input/output port for receiving performance characteristics of the power amplifier * * *.” Again, claim 1 is an apparatus claim, not a method claim.

In any event, the parties agree that “receiving performance characteristics” at least means “attributes or qualities of how the power amplifier is behaving when amplifying signals.” Indeed, it is noted that QSC, in its earlier claim construction brief filed on January 24, 2014 [Dkt. 123] did not advance its construction proposed in the JCCPS [Dkt. 75] filed on August 30, 2013. Rather, QSC proposed that “performance characteristics of the power amplifier” should be construed as “attributes or qualities of how the power amplifier is behaving when amplifying signals.” Dkt. 123 at 27. QSC, however, urges that there was no support for Crest’s addition of “data relating to,” an argument that QSC also advances here.

Crest urges that its proposed construction adding “data relating to” is “inherent” given the context of the claims. QSC, on the other hand, urges that phrase does not appear in the claims, specification or prosecution history, and potentially broadens the claims. The master agrees with QSC.

Yes, in the context of the claim, “digital signal processor * * * having * * * an input/output port for receiving performance characteristics of the power amplifier * * *,” the “performance characteristics of the power amplifier” constitute “data.” But Crest’s proposed construction of “data relating to” potentially sweeps in a broader universe than “performance characteristics of the power amplifier.” Accordingly, that proposed construction is rejected.

4. Recommendation

For the foregoing reasons, the master recommends that the Court conclude that “performance characteristics of the power amplifier” in claims 1 and 4 of the ’542 patent should be construed to mean “attributes or qualities of how the power amplifier is behaving when amplifying signals.”

F. “transmitting control signals for modifying the performance of the power amplifier”

The parties’ proposed the following contested constructions:

Claim Nos.	Crest’s Proposed Construction	QSC’s Proposed Construction
’542 patent, cls. 1, 4	No construction necessary. Otherwise: “electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals”	“Transmitting control signals for adjusting the manner of how the power amplifier is behaving when amplifying signals, not simply avoiding an input that causes certain behavior of the amplifier”
AJCCS [Dkt. 184] at 8, Crest’s Op. Brief [Dkt. 191] at 26, QSC’s Resp. Brief [Dkt. 192] at 38		

1. The Parties’ Arguments

a) Crest’s Opening Brief

Crest urges that “transmitting control signals for modifying the performance of the power amplifier” should be broken into “transmitting control signals,” “modifying,” “performance” and “power amplifier.” Crest’s Op. Brief [Dkt. 191] at 26. Crest urges that the ordinary meaning of “transmitting control signals,” which Crest submits QSC does not dispute, is “electronic communication.” Crest urges that the ordinary meaning of “modifying” is “adjusting a manner” and that the ordinary meaning of the term “performance” is “an active action or operation.” *Id.*

Crest contends that “[w]hen read in context of the claims, the active operation of a power amplifier is the operation of amplifying signals. Consequently, the ordinary meaning of the terms ‘transmitting control signals for modifying the performance of the power amplifier’ is clearly ‘electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals.’” *Id.*

Crest notes that QSC's proposed construction relies on the PTAB's IPR decision discussed above. Crest says that the PTAB "actually agreed to and adopted the very same construction that Crest Audio's submits in this case," *id.*, pointing to the PTAB's decision providing that:

[Defendant] argues that the phrase transmitting signals for modifying the performance characteristics of the amplifier "should be interpreted in the manner suggested by [Crest Audio] in the corresponding litigation [, specifically] '**electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals.**'" Pet. 13-14. For the purpose of this decision, ***we agree*** this construction is the broadest reasonable interpretation.⁴").

Crest's Op. Brief [Dkt. 191] at 27 (emphasis by Crest). Crest urges that "[t]hus, the USPTO unequivocally agreed to Crest Audio's construction of the term." *Id.*

Crest contends that "[t]he phrase 'not simply avoiding an input that causes certain behavior of the amplifier' appears in a later portion of the institution [*sic.*] decision where the USPTO discusses Defendant '*applying* this construction.' *Id.* at 9 (emphasis in original). Accordingly, although the USPTO agreed on Crest Audio's construction, the USPTO found that Defendant had misapplied the construction in its IPR petition. This Court should not construe this claim term to require Defendant's added limitation when the USPTO otherwise concluded that Crest Audio's construction is proper." Crest's Op. Brief [Dkt. 191] at 27.

Crest adds that "[i]n addition, because IPR institution decisions are 'nonappealable' under 35 U.S.C. § 314(d), findings and conclusions in an IPR institution decision are non-binding and carry little weight in a District Court. * * * [citing cases] This Court should likewise not adopt findings from the IPR institution decision." Crest's Op. Brief [Dkt. 191] at 28.

Crest urges that the specification supports that proposed construction. Crest points to the specification providing that "[i]f the performance characteristics of the amplifier 260 are unacceptable, the digital signal processor 250 can send a control signal via the signal path 280 for modifying the amplifier performance." Crest's Op. Brief [Dkt. 191] at 28, quoting '542 patent, col. 5, lines 47-51. Crest urges that "[i]n this instance, the control signal may be electrically communicated via a link between the digital signal processor and the power amplifier to modify the behavior of the power amplifier in some predetermined way." *Id.* at 28-29.

Crest also points to the specification explaining that "the digital signal processor, based on monitored amplifier performance, 'may switch or modulate the power supply voltage to improve

amplifier efficiency and sonic quality.’ ” *Id.* at 29, quoting ’542 patent, col. 7, lines 19-23. Crest says that “in this embodiment, the ’542 patent discloses that the performance of the power amplifier may be modified based on changes made to other components electrically coupled to the power amplifier, such as the power supply in this example.” *Id.* at 29.

Crest further notes that the specification “discloses that the digital signal processor, in response to detected voltage and current values output by the power amplifier, ‘automatically control[s] signal processing functions and parameters in response to the calculated load impedance and power supply.’ ” *Id.*, quoting ’542 patent, col. 7, lines 30-32. Crest says that “[i]n each of these exemplary embodiments disclosed in support of this claim phrase, the specification of the ’542 patent confirms that the digital signal processor is capable of taking action to change the real-time behavior of the power amplifier.” *Id.*

Crest also relies on testimony by its expert. *Id.* at 29-30.

b) QSC’s Responsive Brief

Overall, QSC urges that the Court should apply the PTAB’s decision discussed above:

The parties’ dispute on this term turns on whether the Court should apply the PTAB’s construction as the PTAB understood it. Specifically, the PTAB found that the broadest reasonable interpretation of this claim term requires “changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.” Crest, however, seeks a broader construction. Under Crest’s construction—and directly contrary to the PTAB’s finding—“adjusting the manner of how the power amplifier is behaving when amplifying signals” includes “simply avoiding an input that causes certain behavior of the amplifier.” Crest’s construction is contrary to the intrinsic record and should be rejected.

QSC’s Resp. Brief [Dkt. 192] at 38.

QSC urges that “[t]he PTAB based its construction on the specification and claims,” contending that:

The PTAB focused on the fact that the specification describes modifying amplifier performance by changing the actual behavior of the amplifier. As the specification puts it, “[t]he digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300 and to increase the performance efficiency of the amplifier 100.” The PTAB recognized these disclosures show that, in “transmitting control signals for modifying the performance of the amplifier,” “the functions of the amplifier are adjusted, not simply the input to the amplifier.” The

PTAB's construction, therefore, is founded on the intrinsic evidence and should be adopted.

Id. at 39.

QSC urges that Crest's proposed construction is broader than the PTAB's proposed broadest reasonable construction:

While Crest does not dispute that "modifying the performance of the power amplifier" requires "adjusting the manner of how the power amplifier is behaving when amplifying signals," Crest contends that this limitation encompasses "simply adjusting the signal input to the power amplifier." But this is expressly contrary to, and broader than, what the PTAB believed was the broadest reasonable interpretation. The PTAB held that "simply [adjusting] the input to the amplifier" did not constitute "transmitting control signals for modifying the performance of the power amplifier." Yet, under Crest's construction, the opposite is required.

Id.

QSC contends that "Crest, however, offers no specific basis to believe that the PTAB made a mistake in determining what was, in fact, the broadest reasonable interpretation. Instead, Crest claims that the Court should not should not consider the PTAB's analysis." *Id.* at 39-40. QSC urges that:

But this is contrary to the actual law, where numerous courts have held that claim constructions in IPRs—including in Decisions on Institution—are part of the intrinsic evidence that may be considered. In support of its contrary position, Crest relies on a single, easily distinguished case, *Adidas AG v. Under Armour*. In *Adidas*, the court explicitly noted that the PTAB adopted one party's claim construction for a term "[w]ithout analysis," and thus was unwilling to find that the PTAB's construction resulted in "issue preclusion." By contrast, here the PTAB provided significant analysis in its Decision on Institution, and QSC offers the decision as intrinsic evidence of the proper claim construction, not for purposes of issue preclusion. *Adidas* is simply irrelevant.

Id. at 40.

QSC adds that "Crest's construction is improper for the additional reason that it reads out the explicit claim language 'transmitting,'"

Claim 1 explicitly recites "transmitting control signals," but Crest's construction merely requires an "electronic communication." Thus, even though "transmitting" commonly means to broadcast or send out, Crest's construction does not require this. A construction that reads out explicit claim language is improper. Crest's only defense for its construction is that "[t]he ordinary meaning of the term 'transmitting control signals,' which Defendant does not dispute ... is 'electronic communication.'" QSC certainly

does dispute Crest's "ordinary meaning" of "transmitting control signals," and QSC notes that Crest provides no evidence, either intrinsic or extrinsic, supposedly supporting its "ordinary meaning."

Id. at 40-41.

c) Crest's Reply Brief

Crest reiterates that the PTAB had agreed that Crest's proposed construction of "electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals" was the broadest reasonable interpretation. Crest's Reply [Dkt. 193] at 15-16, citing PTAB decision at 8-9.

Crest points out that QSC is asking the Court to adopt a later portion of the PTAB decision in which the PTAB found that QSC was incorrectly applying that construction. Crest urges that the Court should not construe the phrase to require the limitation QSC adds when the PTAB had otherwise concluded that Crest's proposed construction was proper. Crest's Reply [Dkt. 193] at 16.

Crest further urges that QSC's proposed construction is improper because it adds ambiguity to the phrase through a negative limitation "not simply avoiding an input that causes certain behavior of the amplifier." Crest also urges that makes the phrase ambiguous because QSC does not identify what constitutes "certain behavior." *Id.* at 17.

d) Parties Presentation Slides

Crest presented the following slides during the claim construction hearing illustrating its arguments:

Crest's Presentation Slides

Claim phrase:
**"transmitting control signals for
modifying the performance of the
power amplifier"**

Crest Audio's Proposed Interpretation	QSC's Proposed Interpretation
No construction necessary.	"transmitting control signals for adjusting the manner of how the power amplifier is behaving when amplifying signals, not simply avoiding an input that causes certain behavior of the amplifier"
Otherwise: "electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals"	

No Construction Necessary Because...

- QSC's proposed construction based on PTAB's IPR Institution Decision.
- Claims PTAB construed this claim phrase.
- However, PTAB actually did **NOT** construe this claim phrase. See Doc. 192-3 at 8-9.

Crest's Presentation Slides

PTAB Construed Phrase **NOT** in '542 Patent

Actual claim phrase in '542 patent:

"transmitting control signals for modifying the performance of the power amplifier"

'542 patent: Col. 7, lines 53-54

Claim phrase construed by PTAB:

"transmitting control signals for modifying the performance *characteristics* of the [] amplifier"

PTAB Institution Decision, Doc. 192-3, pp. 8-9.

QSC's Construction Confusing

• QSC's additional construction makes no sense

"transmitting control signals for adjusting the manner of how the power amplifier is behaving when amplifying signals, *not simply avoiding an input that causes certain behavior of the amplifier*"

PTAB's construction of wrong phrase (2 errors) is unreliable and QSC's reliance thereon should be rejected.

• Based on PTAB's incorrect claim phrase

Court Should Adopt Just the Part of Construction Parties Agree On:

"adjusting the manner of how the power amplifier is behaving when amplifying signals"

Crest Audio's Proposed Interpretation	QSC's Proposed Interpretation
No construction necessary.	"transmitting control signals for adjusting the manner of how the power amplifier is behaving when amplifying signals, not simply avoiding an input that causes certain behavior of the amplifier"
Otherwise: "electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals"	

QSC presented the following slides during the claim construction hearing:

QSC's Presentation Slides

"transmitting control signals for modifying the performance of the power amplifier"

QSC's Proposed Construction	Crest's Proposed Construction
"transmitting control signals for adjusting the manner of how the power amplifier is behaving when amplifying signals, not simply avoiding an input that causes certain behavior of the amplifier"	"electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals"

*In applying this construction, however, Petitioner appears to suggest that modifying the input signal to avoid particular behaviors of the amplifier is an example of adjusting the manner of how the power amplifier is behaving. See Pet. 26 and 28. We disagree with how Petitioner interprets the input signal modification. As an example of modifying the performance characteristics of the amplifier, the Specification discloses that "the digital signal processor 250 may switch or modulate the power supply voltages to improve amplifier efficiency and sonic quality." Ex. 1001, col. 7, ll. 22-24. The Specification also discloses that "[t]he digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300 and to increase the performance efficiency of the amplifier 100." *Id.* at col. 5, ll. 51-55. We note that in this quotation the functions of the amplifier are adjusted, not simply the input to the amplifier. In other words, the functions of the amplifier (power supply) itself, such as the voltage, are adjusted. Therefore, the broadest reasonable interpretation of "transmitting control signals for modifying the performance characteristics of the amplifier," consistent with the Specification, requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.*

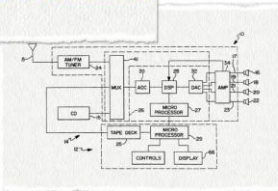
QSC Ex. C at 9

QSC's Presentation Slides

Claim 1 recites "transmitting control signals for modifying the performance characteristics of the amplifier." Petitioner asserts that Porambo's transmission of modified testing signals meets this limitation. Pet. 25-26. We disagree. As noted above, our construction requires the control signal to modify a performance characteristic of the amplifier itself. Porambo's testing signals are sent in such a way as to avoid the clipping characteristic of the amplifier, but they do not change the clipping characteristic of the amplifier. In other words, given any particular input signal, the amplifier of Porambo performs the same way. Porambo simply prohibits input signals that would cause clipping.

But Crest says avoiding clipping does modifying performance of the amplifier

Avoiding clipping does not modify performance of the amp



U.S. Patent No. 5,420,644 70

The K Series Loudspeakers include an input/output port (e.g., a feedback loop) for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

- The DSP algorithms actively manage the performance of the power amplifier. "Intrinsic Correction™, first featured in our high-end line-array products maps 65-75 specially-averaged measurements to IIR and FIR filters that actively adjust time, frequency and amplitude response to a maximally flat bandpass target. The result is a speaker that behaves equally well across the entire sound field." See, e.g., the K Series Product Overview at p. 1.

"Therefore, QSC's Guardrail is not intended to prevent all clipping, just as you wouldn't want a race car to stop short of full power. However, we don't want our users 'spinning out' or damaging their gear, so some kind of backstop is desirable – a guardrail, if you please. The GX measures the onset of clipping, using the activity of the Clip LED, which is driven whenever the global feedback loop detects that the output is no longer able to track the input. This method automatically takes into account all variables of load impedance, AC voltage, and power supply dynamics."

See, e.g., GX FAQ page http://www.qscaudio.com/products/amps/gx/gx_faq.php

Crest Infringement Contentions at *

What is Guardrail?

GuardRail™
GuardRail protection delivers full peak power while preventing detrimental overloads. During excessive clipping, or extreme overheating, GuardRail reduces gain just enough to preserve the integrity of the music, protect the speakers and keep the audience excited, without unprofessional distortion levels or shutdowns.



2. Discussion

a) Term in Context

Claim 1 of the '542 patent, once again, provides:

1. An amplifier comprising:

a power amplifier; and

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the

power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

The claim thus calls for two principal components: (1) a power amplifier, and (2) a digital signal processor. The second limitation describes the “digital signal processor” in terms of being “capable of receiving and storing * * *.”

The third limitation:

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

when parsed as it was in the discussing the prior disputed limitation above:

the digital signal processor
 being connected to the power amplifier and
 having a first input
 for receiving at least one of the algorithm and signal processing function
 parameters and
 an input/output port
 [1] for receiving performance characteristics of the power amplifier and
 [2] for transmitting control signals for modifying the performance of the power
 amplifier. (paragraphing, brackets and emphasis added)

first specifies that the DSP is “connected to the power amplifier.” The claim then specifies that the DSP has a “first input,” and sets out a function for that “first input,” namely “for receiving * * *.”

As noted above, this is an apparatus claim, not a method claim. Structurally, the claim then calls for the DSP to have “an input/output port.” That port is then following by two functional statements that set out the functions for that “input/output port,” namely (1) “for receiving performance characteristics” * * * (namely the disputed phrase discussed above), and (2) “for transmitting control signals * * *” (namely the disputed phrase here).

As discussed above, it is possible, of course, that functional statements can be structurally limiting. However, neither party’s proposed construction appears to structurally limit the “input/output port.” Nevertheless, neither party has raised that issue.

b) Proposed Constructions

(1) Earlier Proposed Constructions

In the JCCPS the parties filed August 30, 2013 [Dkt. 75], the parties proposed the following constructions for “transmitting control signals for modifying the performance of the power amplifier”:

<u>Claim Term</u>	<u>Plaintiff’s Proposed Claim Construction</u>	<u>Defendant’s Proposed Claim Construction</u>
“transmitting control signals for modifying the performance of the power amplifier”	Does not need construction; bears ordinary meaning, which is: “electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals”	“transmitting control signals to modify various performance limits, as opposed to states, of the amplifier circuitry, by changing physical properties such as power supply voltage, maximum output device currents, bias levels, switching frequencies, switching dead time, internal loop gain, and closed-loop audio gain”

(2) QSC’s Petition for IPR

In its petition for *inter partes* review of the ’542 patent, however, QSC did not propose its construction from the JCCPS [Dkt. 75] filed on August 30, 2013. Following that JCCPS, the parties filed respective claim construction briefs. In its brief, QSC no longer urged its proposed construction from the JCCPS. Rather, QSC urged that “transmitting control signals for modifying the performance of the power amplifier” should be construed as “transmitting control signals for adjusting the manner of how the power amplifier is behaving when amplifying signals.” [Dkt. 123] at 28. QSC criticized Crest’s proposed construction as lacking the verb “transmitting.” *Id.*

In its petition for *inter partes* review, however, as noted above, QSC urged the PTAB that “[f]or purposes of this *Inter Partes* Review, the phrase ‘transmitting control signals for modifying the performance characteristics of the amplifier’ as recited in claim 1 should be interpreted in the manner suggested by the Patent Owner [Crest] in the corresponding litigation.” QSC’s IPR Petition at 13-14.

However, as discussed above, the phrase “transmitting control signals for modifying the performance characteristics of the amplifier” does not appear in claim 1 (nor any other claim) of the ’542 patent. Rather, the limitation, in part, that appears in claim 1 is “transmitting control signals for modifying the performance of the power amplifier.”

In the context of the claim, though, the actual limitation, once again, is

the digital signal processor
being connected to the power amplifier and
having a first input
for receiving at least one of the algorithm and signal processing function
parameters and
an input/output port
[1] for receiving performance characteristics of the power amplifier and
[2] for transmitting control signals for modifying the performance of the power
amplifier. (paragraphing, brackets and emphasis added)

Namely, the actual limitation is “for transmitting control signals for modifying the performance of the power amplifier,” namely a functional recitation for the “input/output port” as opposed to a method step of “transmitting control signals for modifying the performance of the power amplifier.”

In any event, QSC urged that the PTAB should adopt Crest’s proposed construction from the JCCPS [Dkt. 75], namely “electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals.” That will be discussed further below.

(3) Current Proposed Constructions

In terms of the function “for transmitting control signals for modifying the performance of the power amplifier,” the parties propose:

Crest’s Proposed Construction	QSC’s Proposed Construction
“electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals”	“Transmitting control signals for adjusting the manner of how the power amplifier is behaving when amplifying signals, not simply avoiding an input that causes certain behavior of the amplifier”

As noted above, QSC criticizes Crest’s proposed construction for using “electronic communication” as opposed to the actual claim language “transmitting control signals.” The master agrees that Crest’s proposed construction, in essence, rewrites the claim, which courts are not empowered to do. Moreover, neither party appears to voice any disagreement over “transmitting control signals.”

Additionally, the function “for transmitting control signals for modifying the performance of the power amplifier,” has an internal “function” for the “control signals,” namely “for modifying the

performance of the power amplifier.” The parties likewise agree that “function” means “adjusting the manner of how the power amplifier is behaving when amplifying signals.”

QSC, though, adds “not simply avoiding an input that causes certain behavior of the amplifier.” What QSC appears to be urging is that the actual claim phrase “for transmitting control signals for modifying the performance of the power amplifier,” does not extend to “not simply avoiding an input that causes certain behavior of the amplifier.” QSC, as noted above, relies on the PTAB’s institution decision for that “negative limitation.”

(4) PTAB Decision

The several “problems” with the PTAB’s decision are addressed extensively in junction with the preceding limitation, namely “for receiving performance characteristics of the power amplifier.” Although those “problems” are alone sufficient to discount the PTAB’s decision, as discussed above, for completeness, an effort will be made to see whether those “problems” can be ignored or overlooked and whether the PTAB’s decision can be considered more substantively.

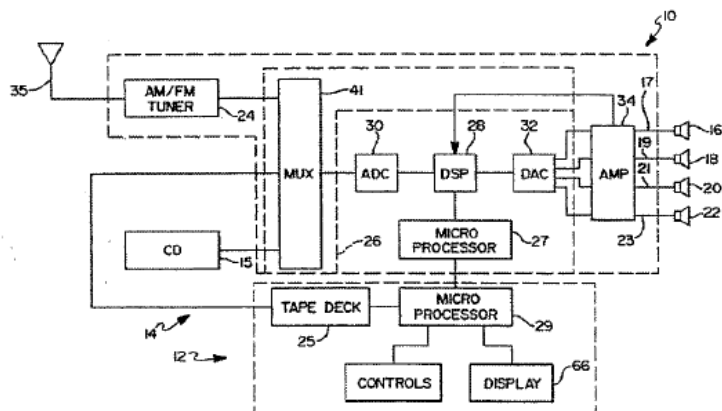
First, QSC did not ask the PTAB in its IPR petition to construe “for receiving performance characteristics of the power amplifier.” As noted above, in QSC’s claim construction brief filed on January 24, 2014, QSC agreed with Crest that limitation, or more precisely “performance characteristics of the power amplifier,” meant “attributes or qualities of how the power amplifier is behaving when amplifying signals.”

Second, QSC, as already repeatedly noted, in its petition for *inter partes* review, QSC urged the PTAB to construe the phrase “transmitting control signals for modifying the performance characteristics of the amplifier” as “electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals.” QSC’s IPR Petition at 13-14. In fact, the actual limitation was “for transmitting control signals for modifying the performance of the power amplifier,” not “performance characteristics.”

The PTAB agreed with the proposed construction, but not “as applied” by QSC. Turning then to QSC’s “application” of the proposed construction, the primary reference QSC relied on was U.S. Patent No. 5,450,624 to Porambo *et al.* In its IPR petition, QSC described Porambo as follows:

The Porambo patent discloses an amplifier design that incorporates a general purpose, programmable digital signal processor into the signal path of the amplifier. The DSP chipset 28 in Porambo performs both digital signal processing functions on a signal to

be amplified and performs a diagnostic function that includes feedback control of the power amplifier 34.



The Porambo patent discloses an improvement to known DSP radio systems for use in automobile car stereos that allows the DSP chipset 28 to detect the operational status of speakers. The DSP chipset 28 can include two DSPs (a Texas Instrument TMS320C25 and a Texas Instrument TMS57002 digital audio signal processor). See Ex. 1005 4: 15-20. Upon the selection of a particular set of buttons on the front of the radio, the DSP generates a tone signal. A clip detector feedback loop 7 4 provides the DSP chipset 28 with a signal from a power amplifier that indicates when the amplifier 34 begins to clip or distort. In response to the received clip signal, the signal level applied to the DIA converter 32 is linearly reduced to establish a limit at which the distortion of the power amplifier reaches an acceptable level. Id. at 5:10-20.

As indicated by claim 12 of the Porambo patent, it is the DSP that generates the test signal and controls the magnitude of the test signal ("DSP programmed processor for generating a test signal and controlling the magnitude of the signal and a DA converter for apply said test signal to the power amplifier") (emphasis added). Porambo indicates that the clipping signal is introduced through an interrupt port (an input/output port) of a signal limiter such a TMS 57002, which reduces the signal level introduced to the DIA converter linearly. Using the broadest reasonable interpretation of "transmitting control signals" discussed above, the DSP chipset 28 has an input/output port that transmits control signals in the form of the reduced level test signal to the power amplifier in order to modify the performance characteristics of the power amplifier (e.g., reduce its distortion).

QSC's IPR Petition at 16 (first emphasis by QSC, second emphasis added). Thus, QSC, although referring to the interpretation of "transmitting control signals," nevertheless likewise refers to "in order to modify the performance characteristics of the power supply (e.g., reduce its distortion)."

QSC urged that Porambo anticipated claim 1:

Porambo discloses each feature of claim 1. As discussed above, Porambo discloses an amplifier with a programmable DSP 28 that has an input for receiving and storing an

algorithm that defines a speaker testing function as well as threshold values (i.e., signal processing function parameters) that are used to detect if speakers are properly connected. See Ex. 1005, 5:20-25 and 6: 18-20.

During testing, the DSP chipset 28 receives a clipping signal produced by a power amplifier (e.g., a performance characteristic) and transmits control signals (modified testing signals) that modify the performance of the power amplifier by reducing its distortion. Ex. 1005 5:1-20.

The DSP in Porambo inherently performs other digital signal processing functions on a signal to be amplified. As discussed above, the Porambo patent discloses a software upgrade to known DSP radio systems. Ex. 1005 6: 14-22. Furthermore, Porambo mentions that it is well known to use DSPs to perform digital processing sound enhancements ("concert hall emulation and other features have been made available by digital signal processing"). *Id.* at 1 :67-2:2. As can be seen from Figure 3 of Porambo, when the switch 33 is set in the upper position, the input audio signals pass through the DSP 28. A person of ordinary skill in the art would recognize that the DSP 28 in Porambo performs at least one digital signal processing function on an audio input signal that is determined by a stored algorithm and digital signal parameters. See Ex. 1003 Declaration of Professor Ellis at page 11 if 1 6.

QSC's IPR Petition at 23-24.

QSC also provided a claim chart comparing claim 1 to Porambo:

Claim 1 of '542	Prior Art
An amplifier comprising:	Porambo discloses a DSP-controlled radio system that includes power amplifiers 34. Ex. 1005 at 5 :4-6.
a power amplifier; and	<i>See</i> power amplifiers 34. <i>Id.</i>
a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,	Porambo discloses a DSP chipset 28 that is capable of receiving and storing an algorithm for detecting if speakers are correctly connected. <i>Id.</i> 6:18-22. ("Only software need be incorporated in the programmable memory of the DSP of a previously known DSP radio assembly") DSP 28 of Porambo also receives and stores signal processing function parameters (threshold values 5:38-50) *note DSP 28 is also referred to as "digital signal processing microprocessor 28" <i>Id.</i> at 4:63.
the digital signal processor being connected to the power amplifier	The output of the DSP 28 is connected to the power amplifier 34. <i>Id.</i> at 5: 1-5 and Figs. 1 and 3
and having a first input for receiving at	Porambo discloses that the DSP 28 include TMS320C25 which is a general

Claim 1 of '542	Prior Art
least one of the algorithm and signal processing function parameters and	purpose programmable DSP with inputs for receiving algorithms and digital signal processing parameters. <i>See</i> Ex. 1012 at page 6.
an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.	Fig. 1 of Porambo shows that the DSP 28 has an input/output port that receives performance characteristics of the power amplifier (clipping signals are applied to the DSP 28 via feedback loop 74) and an input/output port that transmits control signals (reduced level test signals) to the amplifier for modifying the performance of the power amplifier (e.g. reducing clipping or distortion). Ex. 1005 5:1-20 and claim 12 and Ex. 1003 page 12, ¶20.

QSC's IPR Petition at 25-26.

QSC further contended that claim 1 was unpatentable under § 103 as having been obvious over Porambo in view of PCT/US92/03765 to Black et al. ("Black"). QSC's IPR Petition at 26.

QSC urged that "[t]he Black application (Ex. 1006) is submitted as further evidence that it was known to include a DSP in an amplifier with an input/output port that receives performance characteristics of a power amplifier and an input/output port that transmits control signals to modify the performance of the power amplifier." *Id.* at 17.

QSC contended that:

Black discloses an amplifier used in radio frequency applications that includes a power amplifier 203. Ex. 1006, Fig 2. On page 3, lines 17-26, Black states that saturation of the power amplifier occurs when the power amplifier cannot produce as much power as the

control circuitry demands. Saturation may damage some properties of the power amplifier and reduce the efficiency of the power amplifier's operation.

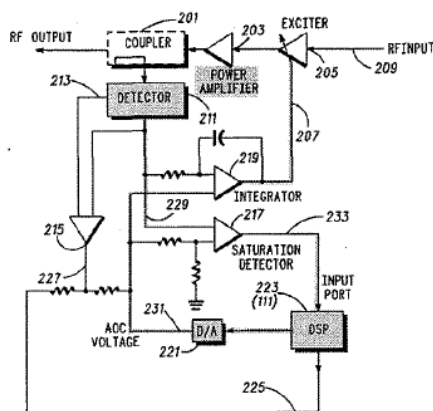


FIG. 2

(Annotated)

A detector 211 detects the power level of the RF output signals and creates a power level signal 229 responsive to the amount of power in the RF output signals. *Id.* at page 8, lines 10-15. Page 9, lines 1-25 of Black describe how the DSP 223 is programmed with an algorithm to react to a saturation detection signal 233 and transmit control signals that cause the voltage on a line 231 to be reduced until the power amplifier comes out of saturation.

QSC's IPR Petition at 17-18.

QSC contended that Porambo and Black are in the same technical field of DSP-controlled amplifiers. Porambo uses a DSP to reduce clipping in the amplifier and therefore reduce distortion. Black uses a DSP to reduce saturation (also a form of distortion) of the power amplifier and increase its efficiency.” *Id.* at 26. QSC further contended that “[a] person of ordinary skill in the art would have been motivated to combine the teachings of Porambo with those of Black as a way to control distortion in the power amplifier and provide output protection for the power amplifier stage. In addition, a person of ordinary skill in the art would have considered it obvious to have the DSP of Porambo receive the performance characteristics of the power amplifier and transmit control signals that modify the performance characteristics as taught by Black as a way to use a single DSP in the amplifier to perform both signal processing and output protection functions rather than having to have separate DSPs to perform these functions. *See* Ex. 1003 Declaration of Professor Ellis at 23, ¶¶46-47.” *Id.* at 26-27. (emphasis added).

QSC also submitted a claim chart comparing claim 1 to the disclosures in Porambo and Black:

Claim 1 of '542	Prior Art
An amplifier comprising:	Porambo discloses a DSP-controlled radio system that includes power amplifiers 34. Ex. 1005 at 5 :4-6.
a power amplifier; and	<i>See</i> power amplifiers 34. <i>Id.</i>
a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,	<p>Porambo discloses a DSP chipset 28 that is capable of receiving and storing an algorithm for detecting if speakers are correctly connected. <i>Id.</i> 6:18-22. ("Only software need be incorporated in the programmable memory of the DSP of a previously known DSP radio assembly")</p> <p>DSP 28 of Porambo also receives and stores signal processing function parameters (threshold values 5:38-50) *note DSP 28 is also referred to as "digital signal processing microprocessor 28" <i>Id.</i> at 4:63.</p>
the digital signal processor being connected to the power amplifier	The output of the DSP 28 is connected to the power amplifier 34. <i>Id.</i> at 5: 1-5 and Figs. 1 and 3
and having a first input for receiving at least one of the algorithm and signal processing function parameters and	<p>Porambo discloses that the DSP 28 include TMS320C25 which is a general purpose programmable DSP with inputs for receiving algorithms and digital signal processing parameters. <i>See</i> Ex. 1012 at page 6.</p>
an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.	<p>Fig. 1 of Porambo shows that the DSP 28 has an input/output port that receives performance characteristics of the power amplifier (clipping signals are applied to the DSP 28 via feedback loop 74). Ex. 1005, Fig. 1</p> <p>Black discloses that the DSP has input/output port that receives a signal indicative of amplifier saturation signal on line 233 and an input/output port (feeding the DIA 221) that transmits control signals to the DI A converter 221 for modifying the performance characteristic of the power amplifier by lowering the signal 231. Ex. 1006, page 9, lines 12-25, Fig. 2.</p>

QSC's IPR Petition at 27-28. Thus, in that claim chart, QSC dropped its prior assertion in its "anticipation" claim chart that Porambo met the "transmitting control signals" limitation by disclosing "an input/output port that transmits control signals (reduced level test signals) to the amplifier for modifying the performance of the power amplifier (e.g. reducing clipping or distortion). Ex. 1005 5:1-20 and claim 12 and Ex. 1003 page 12, ¶20." Rather, QSC urged that "Black discloses that the DSP has input/output port that receives a signal indicative of amplifier saturation signal on line 233 and an input/output port (feeding the DIA 221) that transmits control signals to the DI A converter 221 for modifying the performance characteristic of the power amplifier by lowering the signal 231. Ex. 1006, page 9, lines 12-25, Fig. 2."

Thus, it appears that "obviousness" claim chart, QSC was urging that the "for receiving performance characteristics of the power amplifier" by Porambo ("Porambo shows that the DSP 28 has an input/output port that receives performance characteristics of the power amplifier (clipping signals are applied to the DSP 28 via feedback loop 74)"), and by Black ("Black discloses that the DSP has input/output port that receives a signal indicative of amplifier saturation signal on line 233 * * *").

The PTAB, referring to QSC's petition at pages 26 and 28, wrote that "Petitioner [QSC] appears to suggest that modifying the input signal to avoid particular behaviors of the amplifier is an example of adjusting the manner of how the power amplifier is behaving." [Dkt. 192-3] at 9. The PTAB then says that "We disagree with how Petitioner interprets the input signal modification."

The PTAB's statement is, at best, confusing – which likely appears to result from QSC's representation in the petition that the limitation was "transmitting control signals for modifying the performance characteristics of the amplifier" as opposed to two limitations

- an input/output port
- [1] for receiving performance characteristics of the power amplifier and
- [2] for transmitting control signals for modifying the performance of the power amplifier. (paragraphing and brackets added)

Moreover, QSC repeated that error in discussing the prior art, as noted above – at least sometimes, if not all the time.

Thus, in the actual claim language above, the "input signal" is the stated function of the "input/output port," namely "for receiving performance characteristics of the power amplifier." Nothing in the claim language says that a "signal" representing the "performance characteristics of the power amplifier" is "modified." So, when the PTAB refers to "modifying the input signal" and

QSC's interpretation of "the input signal modification," it is at best unclear what the PTAB is actually referring to.

Too, that discussion comes on the heels of the PTAB adopting "electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals," albeit for the non-existent limitation "transmitting control signals for modifying the performance characteristics of the amplifier." Even if it is assumed that PTAB adopted that construction for the actual claim language "for transmitting control signals for modifying the performance of the power amplifier," the "control signals" have the function of "for modifying the performance characteristics of the amplifier" – not for "modifying the input signal" or resulting in an "input signal modification."

Additionally, the PTAB's citations to the specification do not clear up the confusion.

In Crest's original claim construction brief filed on January 10, 2014, Crest urged that "for modifying the performance of the power amplifier," namely as part of "for transmitting control signals for modifying the performance of the power amplifier," should be construed as "electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals." [Dkt. 119] at 26.

Crest urged its construction was supported by the specification in at least three places. Crest first urged that:

In one embodiment, the specification states that "[i]f the performance characteristics of the amplifier 260 are unacceptable, the digital signal processor 250 can send a control signal via the signal path 280 for modifying the amplifier performance." (Ex. B at Col. 5, lines 47-51). In this instance, the control signal may be electrically communicated via a link between the digital signal processor and the power amplifier to modify the behavior of the power amplifier in some predetermined way.

[Dkt. 119] at 27.

Crest secondly urged that:

The specification of the '542 patent also explains in another embodiment that the digital signal processor, based on monitored amplifier performance, "may switch or modulate the power supply voltage to improve amplifier efficiency and sonic quality." (Ex. B at Col. 7, lines 19-23). Thus, in this embodiment, the '542 patent discloses that the performance of the power amplifier may be modified based on changes made to other components electrically coupled to the power amplifier, such as the power supply in this example. One of ordinary skill would also readily see the actuation of a power amplifier

cooling fan or some other similar mechanism of the power amplifier as a similar adjustment to modify the performance of the power amplifier. (See Ex. F at ¶¶ 49-50).

Id.

Crest thirdly urged that:

In yet another embodiment, the '542 patent specification discloses that the digital signal processor, in response to detected voltage and current values output by the power amplifier, "automatically control signal processing function and parameters in response to the calculated load impedance and power supply." (Id. at Col. 7, lines 30-32). In this embodiment, the digital signal processor may be configured to modify the audio signal and/or attributes of the audio signal, such as various signal processing functions and/or parameters, as the '542 patent specification states. In this approach, an audio signal modified accordingly becomes a control signal when the modification is purposed for modifying the performance of the power amplifier. (See *id.* Col. 7, lines 25-32). For example, the control signal may be sent "to the amplifier to reduce the amount of power thereby preventing damage to the amplifier" in response to "voltage and current detected in the signal path." (See *id.* Col. 3, lines 42-54).

[Dkt. 119] at 28. Crest summarized that:

In sum, the '542 patent specification provides at least three examples of how the digital signal processor may be configured to engage in electronic communication directed to adjusting the performance (*e.g.*, behavior) of the power amplifier, including by: (1) a separate communication path to the power amplifier, (2) electronic communication with a component of the power amplifier, such as, for example, a power supply, amplifier circuit functions, a fan, *etc.*, to cause a modification of the performance (*e.g.*, cool to reduce distortion levels or increase performance efficiency, *etc.*) of the power amplifier, and/or (3) using or manipulating the audio signal output by the digital signal processor in the signal path so that it causes modified behavior in the power amplifier (*i.e.*, attenuating the audio signal to reduce the amount of power delivered by the power amplifier). (See Ex. B at FIG. 2, Col. 7, lines 25-32, Col. 3, lines 42-54). In each of these examples disclosed in support of this claim phrase, the specification of the '542 patent confirms that the digital signal processor is capable of taking action to change the real-time behavior of the power amplifier.

[Dkt. 119] at 28-29.

Thus, Crest had relied, *inter alia*, on the '542 patent, col. 3, lines 42-54, col. 5, lines 47-51, col. 7, lines 25-32, and at least three embodiments. In its IPR petition, QSC urged that "[t]he Patent Owner is proposing that the phrase be interpreted as 'electronic communication for adjusting the manner of how the power amplifier is behaving when amplifying signals' citing at least Ex. 1001 7 :28-32 ('The digital signal processor 250 can automatically control signal processing functions and

parameters in response to the calculated load impedance and power supply.”). See Ex. 1013, page 6 discussed below.” QSC’s IPR Petition at 14.

The PTAB, when it issued its institution decision, had a copy of the parties’ JCCPS [Dkt. 75] (which listed the “intrinsic evidence” that the parties were relying on), but the PTAB did not have a copy of the parties’ claim construction briefing.

After stating that “[w]e disagree with how Petitioner interprets the input signal modification,” the PTAB pointed to two portions of the specification. With respect to the first, the PTAB wrote:

As an example of modifying the performance characteristics of the amplifier, the Specification discloses that “the digital signal processor 250 may switch or modulate the power supply voltages to improve amplifier efficiency and sonic quality.” Ex. 1001, col. 7, ll. 22-24.

[Dkt. 192-3] at 9. With respect to the second, the PTAB wrote:

The Specification also discloses that “[t]he digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300 and to increase the performance efficiency of the amplifier 100.” *Id.* at col. 5, ll. 51-55.

Id.

In context, that portion of the specification explains that, in reference to Fig. 2:

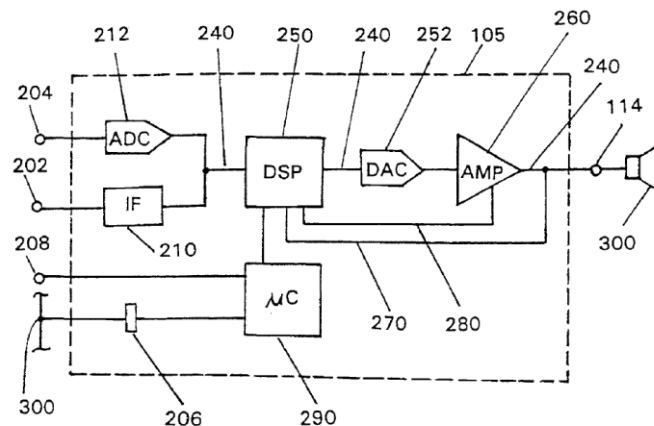


FIG. 2

The main signal path 240 is connected to at least two additional signal paths 270, 280 for detecting load characteristics and monitoring and controlling amplifier performance, respectively. More specifically, the power supply control signal path 280 is connected between the power amplifier 260 and the digital signal processor 250 and includes a digital/analog converter and an analog/digital converter (not shown) for allowing

transfer of signals therebetween. Through the power supply control signal path 280, the digital signal processor 250 can receive and monitor the performance characteristics of the power amplifier 260. If the performance characteristics of the amplifier 260 are unacceptable, the digital signal processor 250 can send a control signal via the signal path 280 for modifying the amplifier performance. The digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300 and to increase the performance efficiency of the amplifier 100.

'542 patent, col. 5, lines 37-55.

The PTAB noted that “in this quotation the functions of the amplifier are adjusted, not simply the input to the amplifier. In other words, the functions of the amplifier (power supply) itself, such as the voltage, are adjusted.” [Dkt. 192-3] at 9.

The PTAB then concludes, based on the foregoing, that “[t]herefore, the broadest reasonable interpretation of ‘transmitting control signals for modifying the performance characteristics of the amplifier,’ consistent with the Specification, requires changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier.” *Id.*

The PTAB reached that conclusion *sua sponte*, without any input from the parties. That was not a construction that QSC advocated, and neither QSC’s nor Crest’s actual claim construction arguments in their respective claim construction briefs, previously filed in this cause, were presented to the PTAB. And, with all due respect to the PTAB, the portion of the specification that the PTAB cited to plainly explained “[t]hrough the power supply control signal path 280, the digital signal processor 250 can receive and monitor the performance characteristics of the power amplifier 260. If the performance characteristics of the amplifier 260 are unacceptable, the digital signal processor 250 can send a control signal via the signal path 280 for modifying the amplifier performance.”

Additionally, the PTAB did not seem to appreciate that the specification of the '542 patent discloses several embodiments, and claim 1 is not necessarily limited to only one of those embodiments.

For example, the specification of the '542 patent explains that:

Thus, when digital audio signals are input to the digital signal processor 250, the audio signals are modified in accordance with the signal processing functions and parameters set by the control signals input to the digital signal processor 250 from the microprocessor 290. The digital audio signals are then output from the digital signal

processor 250 and are converted to analog signals by the converter 252 and then sent to the power amplifier 260 and then to the loudspeaker 300.

'542 patent, col. 7, lines 9-17. In that embodiment, “the audio signals are modified in accordance with the signal processing functions and parameters set by the control signals input to the digital signal processor 250 from the microprocessor 290” and then the “digital audio signals are then output from the digital signal processor 250 and are converted to analog signals by the converter 252 and then sent to the power amplifier 260 and then to the loudspeaker 300.”

The specification also describes an additional embodiment, namely:

The amplifier performance is monitored by the signal path 280 to provide an additional control over the performance of the power amplifier 260 as described above. For example, the digital signal processor 250 may switch or modulate the power supply voltages to improve amplifier efficiency and sonic quality.

The signal path 270 monitors and detects the voltage and current of the signal output from the amplifier 260 and inputs the detected voltage and current values to the digital signal processor 250 which calculates the load impedance and power supplied to the load 300. The digital signal processor 250 can automatically control signal processing functions and parameters in response to the calculated load impedance and power supply.

'542 patent, col. 7, lines 18-32. Namely, in that embodiment, “[t]he amplifier performance is monitored by the signal path 280 to provide an additional control over the performance of the power amplifier 260 as described above.”

When the PTAB wrote “[w]e disagree with how Petitioner interprets the input signal modification,” wrote:

As an example of modifying the performance characteristics of the amplifier, the Specification discloses that “the digital signal processor 250 may switch or modulate the power supply voltages to improve amplifier efficiency and sonic quality.” Ex. 1001, col. 7, ll. 22-24.

[Dkt. 192-3] at 9, the PTAB was plainly referring to what was described in the specification as an additional embodiment (“The amplifier performance is monitored by the signal path 280 to provide an additional control over the performance of the power amplifier 260 as described above.”)

The reference to “as described above” plainly refers to the earlier description of “detecting load characteristics and monitoring and controlling amplifier performance, respectively.” In particular, the specification discloses that, in reference to Fig. 2:

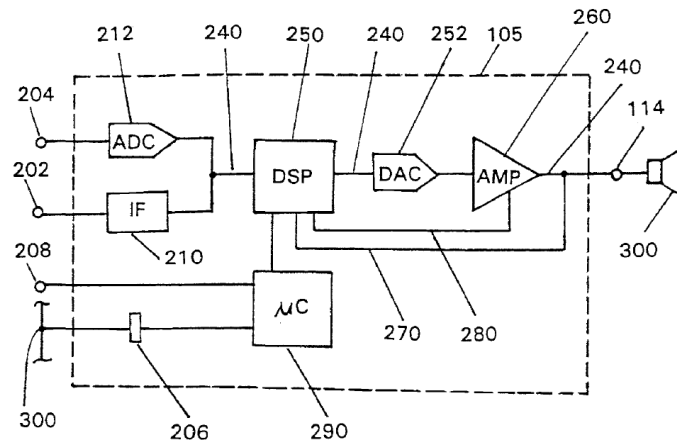


FIG. 2

that:

The main signal path 240 is connected to at least two additional signal paths 270, 280 for detecting load characteristics and monitoring and controlling amplifier performance, respectively. More specifically, the power supply control signal path 280 is connected between the power amplifier 260 and the digital signal processor 250 and includes a digital/analog converter and an analog/digital converter (not shown) for allowing transfer of signals therebetween. Through the power supply control signal path 280, the digital signal processor 250 can receive and monitor the performance characteristics of the power amplifier 260. If the performance characteristics of the amplifier 260 are unacceptable, the digital signal processor 250 can send a control signal via the signal path 280 for modifying the amplifier performance. The digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300 and to increase the performance efficiency of the amplifier 100.

'542 patent, col. 5, lines 37-55.

When the PTAB wrote:

The Specification also discloses that “[t]he digital signal processor may control power supply or amplifier circuit functions based on input audio signals and amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300 and to increase the performance efficiency of the amplifier 100.” *Id.* at col. 5, ll. 51-55.

the citation to “col. 5, ll. 51-55” the PTAB was referring a portion of the specification that disclosed that the “digital signal processor” “may control” “power supply or amplifier circuit functions based on input audio signals” as well as “amplifier power and distortion levels to prevent damage to the amplifier 260 and the load 300.” ’542 patent, col. 5, lines 51-55.

Once again, the actual claim language calls for:

an input/output port
 [1] for receiving performance characteristics of the power amplifier and
 [2] for transmitting control signals for modifying the performance of the power amplifier. (paragraphing and brackets added)

That claim language, especially “for transmitting control signals for modifying the performance of the power amplifier,” is not limited to requiring “changing the actual behavior of the amplifier, not simply avoiding an input that causes certain behavior of the amplifier” – nothing in the claim language nor the context of the claim requires that construction. Moreover, the portion of the specification that the PTAB *sua sponte* relied on does not require that the claim language be so limited. Nor has QSC pointed to any other portion of the specification that requires that the claim language be so limited.

QSC’s original error in representing claim 1 of the ’542 patent had a limitation requiring “transmitting control signals for modifying the performance characteristics of the amplifier” – a non-existent limitation – coupled with the PTAB’s *sua sponte* “construction” above – plainly influenced the PTAB’s conclusions. For example, the PTAB, in rejecting QSC’s contention that Porambo anticipated claim 1 reasoned:

Claim 1 recites “transmitting control signals for modifying the performance characteristics of the amplifier.” Petitioner asserts that Porambo’s transmission of modified testing signals meets this limitation. Pet. 25-26. We disagree. As noted above, our construction requires the control signal to modify a performance characteristic of the amplifier itself. Porambo’s testing signals are sent in such a way as to avoid the clipping characteristic of the amplifier, but they do not change the clipping characteristic of the amplifier. In other words, given any particular input signal, the amplifier of Porambo performs the same way. Porambo simply prohibits input signals that would cause clipping.

Thus, Petitioner has not shown sufficiently that Porambo discloses “transmitting control signals for modifying the performance characteristics of the amplifier,” as required by claim 1. Upon review of Petitioner’s analysis and supporting evidence, we determine that Petitioner has not demonstrated that there is a reasonable likelihood that it would prevail with respect to claim 1 and claims 3 and 10, that depend ultimately on claim 1, on the ground that these claims are anticipated by Porambo.

[Dkt. 192-3] at 10-11.

Thus, the PTAB’s conclusion rests on (1) a limitation “transmitting control signals for modifying the performance characteristics of the amplifier” that the PTAB sets out in quotes – but is a limitation that does not actually exist in claim 1 of the ’542 patent (or in any claim or in any portion of the ’542 patent specification) – and in a decision that refers to that non-existent limitation not once, but twice, and (2) the PTAB’s *sua sponte* construction that “requires the control signal to modify a performance characteristic of the amplifier itself,” which, as discussed above, the PTAB did not show in its opinion was actually required by the claims, specification or prosecution history of the ’542 patent – and which QSC likewise has not shown here.

“Minor errors” in a PTAB’s decision can perhaps be overlooked or reconciled, but (1) relying, repeatedly, on a non-existent claim limitation, and (2) *sua sponte* arriving at a “construction” nowhere advocated by the petitioner (and devoid of input from the patent owner – even indirectly through a submission of claim construction briefing), are not “minor errors.” Those “errors” go to the heart of the PTAB’s decision.

Similarly, in connection with QSC’s assertion that claim 1 would have been obvious under § 103 in view of Porambo and Black, the PTAB rejected that assertion, reasoning:

Claim 1 recites “transmitting control signals for modifying the performance characteristics of the amplifier.” Petitioner asserts that Black’s transmission of a lowered input signal 231 meets this limitation. Pet. 28. As noted above, our construction requires the control signal to modify a performance characteristic of the amplifier. Black’s input signal is kept within a range to avoid the saturation characteristic (or any other characteristic) of the amplifier, but it does not change the saturation characteristic of the amplifier. In other words, given any particular input signal, the amplifier of Black performs the same way. Black simply provides input signals that are within a range that would not cause saturation.

Thus, Petitioner has not shown sufficiently that Porambo and Black teach or suggest “transmitting control signals for modifying the performance characteristics of the amplifier,” as required by claim 1. Upon review of Petitioner’s analysis and supporting evidence, we determine that Petitioner has not demonstrated that there is a reasonable

likelihood that it would prevail with respect to claim 1, and claims 3, 4 and 8, that depend ultimately on claim 1, on the ground that these claims would have been obvious over Porambo and Black.

[Dkt. 192-3] at 11-12.

Once again, the PTAB's conclusion rests on (1) a limitation "transmitting control signals for modifying the performance characteristics of the amplifier" that the PTAB sets out in quotes – but is a limitation that does not actually exist in claim 1 of the '542 patent (or in any claim or in any portion of the '542 patent specification) – and in a decision that refers to that non-existent limitation not once, but twice, and (2) the PTAB's sua sponte construction that "requires the control signal to modify a performance characteristic of the amplifier itself," which, as discussed above, the PTAB did not show in its opinion was actually required by the claims, specification or prosecution history of the '542 patent – and which QSC likewise has not shown here.

Yet again, those are not "minor errors."

With respect to the arguments that QSC raised during claim construction, as reflected in the foregoing slides re "clipping," it is believed that the foregoing adequately addresses those arguments in terms of claim construction. But, of course, ultimately those arguments will be addressed in a forum deciding infringement and non-infringement, for example during motions for summary judgment.

3. Recommendation

For the foregoing reasons, the master recommends that the Court construe "for transmitting control signals for modifying the performance of the power amplifier," in the context of claim 1 of the '542 patent:

an input/output port

[1] for receiving performance characteristics of the power amplifier and

[2] for transmitting control signals for modifying the performance of the power amplifier. (paragraphing and brackets added)

as "transmitting control signals for adjusting the manner of how the power amplifier is behaving when amplifying signals."

G. “controller”

The parties’ proposed the following contested constructions:

Claim Nos.	Crest’s Proposed Construction	QSC’s Proposed Construction
’542 patent, cls. 6, 7	No construction necessary. Otherwise: “electronic device that exercises some level of control in a system, such as, for example, a microprocessor”	“a microprocessor, separate and distinct from the digital signal processor”
AJCCS [Dkt. 184] at 9, Crest’s Op. Brief [Dkt. 191] at 30, QSC’s Resp. Brief [Dkt. 192] at. 42		

The “core dispute” is whether the “controller” must be a “microprocessor” that is “separate and distinct from the digital signal processor” as QSC asserts.

1. Disputed Term in Context

In context, the disputed term appears in the ’542 patent as follows:

1. An amplifier comprising:

a power amplifier; and

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

6. The amplifier of claim 1, further comprising a controller for receiving the algorithm and the signal processing function parameters and transmitting the algorithm and the signal processing function parameters to the digital signal processor.

7. The amplifier of claim 6, wherein the controller comprises a programmable microprocessor for receiving at least one of the algorithm and the signal processing function parameters to be transmitted to the digital signal processor.

2. The Parties' Arguments

a) Crest's Opening Brief

(1) Ordinary Meaning

Crest urges that “controller” does not require construction, and should be given its “ordinary and customary meaning” of an “electronic device that exercises some level of control in a system, such as, for example, a microprocessor.”

Crest contends that:

To one of ordinary skill in the art, the ordinary meaning of a controller is an electronic device that exercises some level of control in a system. This may be, for example a microprocessor. In fact, claim 7 of the '542 patent claims the embodiment of the “controller” of claim 6 to comprise a “microprocessor.” Because claim 6 is broader than its dependent claim 7, as a matter of law, it necessarily means that the “controller” of claim 6 is not restricted to a “microprocessor.” In an effort to clarify its proposed construction in view of at least claims 6 and 7, Crest Audio, submits that a “controller” is an “electronic device that exercises some level of control in a system, which may include a microprocessor.”

Crest's Op. Brief [Dkt. 191] at 30.

With respect to QSC's proposed construction that the “controller” must be “separate and distinct from the digital signal processor,” Crest urges that “[i]t is clear from the '542 patent that the invention includes a ‘digital signal processor’ and a ‘controller,’ but that does not mean that the two components cannot reside on the same physical chip or share resources. One of ordinary skill in the art would understand that controller functionality was being built into the DSP chips and was likely, and desirably, already part of many of the DSP offerings available at the time of invention.” Crest's Op. Brief [Dkt. 191] at 31, citing a declaration by its expert Mr. Pirkle [Dkt. 191-11].

Crest also urges that QSC's proposed construction of “separate and distinct” is “unclear,” for example “if two circuits should be considered separate and distinct when those two circuits are embedded in the same chip, module, or circuit board,” or “when those two circuits share common resources such as power supply, memory, interfaces, or other circuitry.” *Id.*

Crest further urges that the specification counsels against QSC's proposed construction. Crest points to Fig. 2:

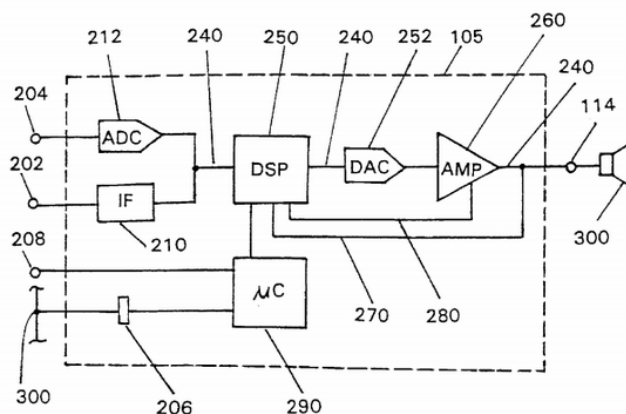


FIG. 2

illustrating a functional block diagram showing DSP 250 and a “functional block” microcontroller 290.

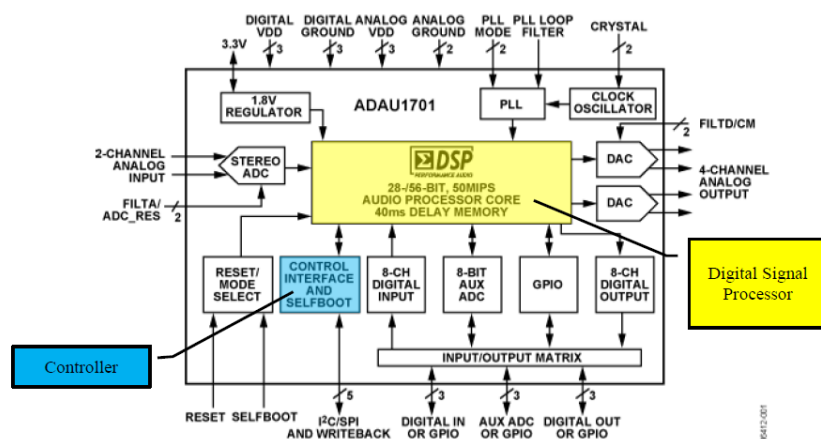
Crest urges, again referencing Mr. Pirkle's declaration, that “[o]ne of ordinary skill in the art would understand that the functional blocks of FIG. 2 (*e.g.*, reference number 250 and reference number 290, *etc.*) provide no restrictions as to the structure of the schematic of FIG. 2. Ex. J at ¶ 53. Crest Audio's expert explains that FIG. 2 represents a ‘functional block diagram’ of *functional arrangements* of components, *not structural arrangements*. *Id.* Thus, Defendant's attempt to limit the controller to be a “separate and distinct” structure is contrary to what is understood by one of ordinary skill in this art.” Crest's Op. Brief [Dkt. 191] at 32.

Crest also notes that “the specification discloses a ‘digital signal processing module 200’ where ‘a portable programmer input port 208 is provided on the module 200.’ Ex. B at Col. 4, lines 49-59. ‘The digital signal processor module 200 includes a digital signal processor 250.’ Ex. B at Col. 5, lines 6-7. The portable programmer input port 208 is received via a ‘controller preferably in the form of a microprocessor.’ *Id.* at lines 16-25 and FIG. 2. This allows for the possibility that the controller 290 *and* the digital signal processor 250 are both part of the digital signal processor module 200. Indeed, the ‘542 patent also describes that ‘[a] controller, preferably in the form of a microprocessor, is provided *in the digital signal processor . . .*’ *Id.* at 3:13-15 (emphasis added). Thus, requiring the controller

to include the limitation of ‘separate and distinct’ contradicts the specification’s disclosure of a digital signal processing module 200.” *Id.*

Crest further points to its expert’s declaration that “Defendant’s proposed construction for the term as ‘a microprocessor, separate and distinct from the digital signal processor’ does not agree with digital signal processor manufacturers’ own definitions.” *Id.*, citing Pirkle declaration [Dkt. 191-11] ¶ 56. Crest and Mr. Pirkle note that a Motorola 56302 device has functional blocks that represent a DSP core and a PCI controller together with other components even though the DSP core and the PCI controller are “built into one physical package” and contained on a single piece of silicon. *Id.*

Crest and Mr. Pirkle also point an ADAU1701 device as an example of a “complete single-chip audio system with *** audio DSP *** and microcontroller-like control interfaces.



Crest’s Op. Brief [Dkt. 191] at 33-34, citing and illustrating [Dkt. 191-13] at 11 (annotations by Crest).

Crest urges that “[t]he Motorola 56302 and the ADAU1701, which separate the DSP and the controller in terms of functionality but implement them in a single integrated chip, illustrate commercial examples that refute Defendant’s construction that a controller must be ‘separate and distinct from the DSP.’ Therefore, the court should reject Defendant’s proposal and adopt Crest Audio’s construction, as the latter construction does not arbitrarily restrict the meaning of the term ‘controller’ to be ‘separate and distinct from the digital signal processor.’ ” *Id.* at 34.

b) QSC's Responsive Brief

QSC first notes that claim 6 calls for “[t]he amplifier of claim 1, further comprising a controller for receiving the algorithm and the signal processing function parameters and transmitting the algorithm and the signal processing function parameters to the digital signal processor.” Thus, QSC urges that “the context of the claim language in which the term ‘controller’ appears mandates that the controller be a structure that is *separate* and *distinct* from the DSP. Otherwise, the controller could not ‘*transmit*[] the algorithm and the signal processing function parameters’ to the DSP, as the claims require.” QSC’s Resp. Brief [Dkt. 192] at 42-43.

QSC secondly notes that “every discussion of the interactions between the controller and DSP in the amplifier shows the same thing: That the controller is separate and distinct from the DSP. For example, the specification states:

- ‘A controller preferably in the form of a microprocessor 290 is provided in the amplifier.’
- ‘The microprocessor 290 gathers control signals and/or signal processing programs to be loaded into the digital signal processor 250.’
- ‘The microprocessor 260 [sic 290] then downloads the control signals to the digital signal processor 290 [sic 250] by digital data transfer in either the serial or parallel form.’
- ‘The microprocessor 290 may have its own program for computing data and coefficients based on information passed to it over the network bus 300 or programmer port 208 or it may simply pass on data that is readily usable by the digital signal processor 250.’
- ‘The control signals received in the digital signal processor 250 from the microprocessor 290 . . . ’
- ‘ . . . control signals input to the digital signal processor 250 from the microprocessor 290.’ ”

QSC’s Resp. Brief [Dkt. 192] at 43-44.

With respect to Crest’s argument that it is unclear whether “separate and distinct” precludes the devices from being on the same physical chip or sharing resources, QSC says that “there is nothing in QSC’s construction that precludes the controller and DSP from being on the same chip or the controller sharing resources with the DSP. The touchstone for whether the devices are separate and distinct is whether the controller is capable of transmitting algorithms and parameters to the DSP as

required by claim 6—devices that can transmit to each other are separate and distinct; those that can't, aren't. Put differently, being separate and distinct has nothing to do with whether the devices are on the same physical chip or share resources. 'Separate and distinct' is mandated by claim 6's 'transmitting' requirement." *Id.* at 44.

QSC urges that Crest's contention that the specification "allows for the possibility that the controller 290 and the digital signal processor 250 are both part of the digital signal processor module 200," is irrelevant. QSC contends that "[w]hether the two components are part of the same multi-component module or not has no bearing on whether they are separate and distinct. The ability to transmit between components is what differentiates separate and distinct components from those that are not separate and distinct—regardless of whether the components share space on the same silicon chip or not." *Id.* at 44-45.

With respect to Crest's extrinsic evidence, QSC urges that "at best, all Crest's extrinsic evidence shows is that a controller and DSP can be on the same chip. But as stated above, this observation is irrelevant to the question of whether the devices are separate and distinct." *Id.* at 45.

With respect to Crest's argument that a "controller" need not necessarily be a "microprocessor," QSC urges that is required by the specification: "For instance, Fig. 2 of the '542 patent discloses a 'microprocessor 290' nine separate times. There is no disclosure of a controller in the '542 patent other than a microprocessor, and a person of ordinary skill would have understood that the controller claimed in the '542 patent is a microprocessor. Indeed, even Mr. Pirkle previously opined that '[t]o a person of ordinary skill in this art, the term "controller" means a "microprocessor." ' " *Id.* at 45, citing a Pirkle declaration of January 10, 2014 [Dkt. 119-6] at ¶ 52.

With respect to Crest's claim differentiation argument based on claim 7, QSC urges that the "Federal Circuit has repeatedly explained that not only is the doctrine of claim differentiation not a 'hard and fast rule,' but it has no applicability where—as here—there are other limitations in the dependent claim." *Id.* at 45-46, citing *Regents of Univ. of Cal. v. Dakocytomation Cal., Inc.*, 517 F.3d 1364, 1375 (Fed. Cir. 2008) and *Black & Decker, Inc. v. Robert Bosch Tool Corp.*, 260 Fed. Appx. 284, 289-90 (Fed. Cir. Jan. 7, 2008).

QSC urges that "[h]ere, claim 7 includes limitations that are not present in claim 6, from which it depends. Specifically, claim 7 recites '[t]he amplifier of claim 6, wherein the controller comprises a programmable microprocessor....' This is more specific than the general purpose microprocessor

proposed by QSC's construction, and thus, does not trigger the doctrine of claim differentiation." *Id.* at 46.

c) Crest's Reply Brief

Crest says that "[t]he problem with QSC's construction is that it leads to more questions, such as: (a) What is 'separate and distinct?'; and (b) What is and is not a digital signal processor in this context?" Crest's Reply [Dkt. 193] at 17.

Crest urges that "although QSC admits that 'separate and distinct has nothing to do with whether the devices are on the same physical chip or share resources' * * *, QSC's proposed construction still makes it uncertain when a DSP and controller would or would not be considered separate and distinct." *Id.* at 18.

Crest further urges that "it is clear that QSC is now attempting to advance a construction for the term 'digital signal processor,' even though it did not identify this term for claim construction, as required by the Court's Patent Rules (Dkt. 37). Yet, QSC admits, as stated above, that a DSP can reside on the same computer chip as a controller, so it is unclear as to where QSC contends that a DSP ends a controller begins. QSC's proposed construction raises these ambiguities, and the Court should accordingly reject it as vague and inconclusive." *Id.*

With respect to whether "controller" is limited to a "microprocessor," and QSC's citations to the specification, Crest responds that "it is well established that claims 'generally are not limited to any particular embodiment disclosed in the specification, even where only a single embodiment is disclosed.' " *Id.* citing *Superior Indus.*, 2014 U.S. App. LEXIS 855 (citing *Innova/Pure Water*, 381 F.3d at 1117).

With respect to QSC's citation to Mr. Pirkle's January 2014 declaration, Crest says that Mr. Pirkle has "further clarified his opinion to make clear that a controller is not necessarily limited to only a microprocessor. *See* Dkt. 191, ¶ 52 ('the term "controller" means "an electronic device that exercises some level of control in a system, such as, for example, a microprocessor").' " *Id.* at 18-19. Crest urges that its proposed construction is not inconsistent with Mr. Pirkle's statements.

Regard claim differentiation and claim 7, Crest urges that "QSC misses the point. Not only must a 'controller' be broader than a 'microprocessor,' but the fact that the patentee used the term 'controller' in claim 6 and the term 'microprocessor' in claim 7 shows that a controller cannot be

limited to only a microprocessor.” *Id.* at 19, citing *Chi. Bd. Options Exch., Inc. v. Int’l Sec. Exch., LLC*, 677 F.3d 1361, 1369 (Fed. Cir. 2012) (“The general presumption that different terms have different meanings remains.”).

3. Parties’ Presentation Slides

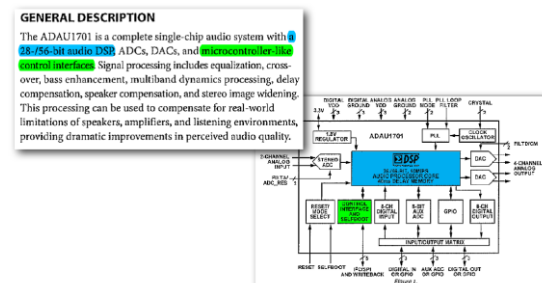
Crest presented the following slides illustrating its arguments at the claim construction hearing:

Crest’s Presentation Slides

Claim term: “controller”

Crest Audio’s Proposed Interpretation	QSC’s Proposed Interpretation
No construction necessary. Otherwise: “electronic device that exercises some level of control in a system, such as, for example, a microprocessor” ⁶	“a microprocessor, separate and distinct from the digital signal processor”

What is Separate and Distinct?



The Specification Makes it Clear

The controller is **preferably, but not limited to, a microprocessor.**

A controller, **preferably in the form of a microprocessor**, is provided in the digital signal processor for processing the control signals for modifying signal processing programs and coefficients to modify the functions and function parameters defined by the program. The control signals are input

What is "Separate and Distinct?"

- QSC's construction more unclear than claim term itself
- QSC seems to imply physical separation in the context of integrated circuits
- QSC admits "separate and distinct" has nothing to do with whether the controller is on the same chip as the DSP or if shares resources

A Controller Is Not Limited to a Microprocessor

- QSC says only a microprocessor is disclosed in the specification
- But claims generally are not limited to any particular embodiment disclosed in the specification

Dependent Claim 7 Makes it Clear

The fact that the patentee used **"controller"** in claim 6 and **"microprocessor"** in claim 7 shows that a controller cannot be limited to only a microprocessor.

7. The amplifier of claim 6, wherein the **controller** comprises **a programmable microprocessor** for receiving at least one of the algorithm and the signal processing function parameters to be transmitted to the digital signal processor.

QSC presented the following slides at the claim construction hearing illustrating its arguments:

QSC's Presentation Slides

"controller"

QSC's Proposed Construction	Crest's Proposed Construction
"a microprocessor, separate and distinct from the digital signal processor"	"electronic device that exercises some level of control in a system, such as, for example, a microprocessor"

6. The amplifier of claim 1, further comprising a controller for receiving the algorithm and the signal processing function parameters and transmitting the algorithm and the signal processing function parameters to the digital signal processor.

FIG. 2

5:22 patent at 5:29-37

function parameters. The microprocessor 290 gathers control signals and/or signal processing programs to be loaded into the digital signal processor 250. The microprocessor

5:22 patent at 6:33-37

microprocessor 290. The microprocessor 260 then downloads the control signals to the digital signal processor 290 by digital data transfer in either the serial or parallel form.

5:22 patent at 6:42-47

signal processing function or functions. The microprocessor 290 may have its own program for computing data and coefficients based on information passed to it over the network bus 300 or programmer port 208 or it may simply pass on data that is readily usable by the digital signal processor 250.

5:22 patent at 7:1-2

The control signals received in the digital signal processor 250 from the microprocessor 290 modify and/or combine at

5:22 patent at 7:12-14

eters set by the control signals input to the digital signal processor 250 from the microprocessor 290. The digital

6. The amplifier of claim 1, further comprising a controller for receiving the algorithm and the signal processing function parameters and transmitting the algorithm and the signal processing function parameters to the digital signal processor.

7. The amplifier of claim 6, wherein the controller comprises a programmable microprocessor for receiving at least one of the algorithm and the signal processing function parameters to be transmitted to the digital signal processor.

Specification describes two different microprocessor embodiments

Claim 7's programmable microprocessor

The microprocessor 250 may transfer programs in a form executable by the digital signal processor 250 or may transfer coefficients and data to be used by the program stored in the digital signal processor 250 in executing the signal processing function or functions. The microprocessor 290 may have its own program for computing data and coefficients based on information passed to it over the network bus 300 or programmer port 208 or it may simply pass on data that is readily usable by the digital signal processor 250.

Claim 6's non-programmable microprocessor

4. Discussion

First, the parties do not dispute the meaning of “controller” *per se*. Rather, the dispute between the parties is whether “controller” in claims 6 and 7 of the ’542 patent is limited to a “microprocessor,” as QSC asserts, and secondly whether such “controller” must be “separate and distinct from the digital signal processor,” also as QSC asserts. Namely, QSC does not contend that Crest’s proposed explanation of a “controller” as an “electronic device that exercises some level of control in a system, such as, for example, a microprocessor” is wrong – only that the term should be further limited as QSC proposes.

a) “microprocessor”

With respect to the question whether “controller” must be limited to a “microprocessor,” the answer is plainly no. The specification clearly provides that the “controller” is “preferably” a “microprocessor”:

A controller, preferably in the form of a microprocessor, is provided in the digital signal processor for processing the control signals for modifying signal processing programs and coefficients to modify the functions and function parameters defined by the program. * * * The controller may also be programmed to compute parameters for the digital signal processor based on command signals input from the network or the portable programmer.

’542 patent, col. 3, lines 13-24. Although, as QSC points out, the specification frequently refers to “microprocessor 290,” the specification also plainly explains that “A controller preferably in the form of microprocessor 290 is provided in the amplifier.” ’542 patent, col. 5, lines 16-17. References to a preferred embodiment are generally not limiting. *See Laitram Corp. v. Cambridge Wire Cloth Co.*, 863 F.2d 855, 865 (Fed.Cir.1988) (“References to a preferred embodiment, such as those often present in a specification, are not claim limitations.”); *Texas Instruments, Inc. v. United States Int’l Trade Comm’n*, 805 F.2d 1558, 1563 (Fed.Cir.1986) (“This court has cautioned against limiting the claimed invention to preferred embodiments or specific examples in the specification.”). *See also, Phillips*, 415 F.3d at 1323 (“although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments. * * * In particular, we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment. * * * That is not just because section 112 of the Patent Act requires that the claims themselves set forth the limits of the patent grant, but also because persons of ordinary skill in the art rarely would confine their definitions of terms to the

exact representations depicted in the embodiments.”). In particular, QSC has pointed to nothing in the specification, or in the nature of the invention, that would or should restrict “controller” to a “microprocessor.” Indeed, the specification, as noted above, discloses that the “controller” may be “programmed” to perform certain computations.

That is further buttressed by dependent claim 7:

6. The amplifier of claim 1, further comprising a controller for receiving the algorithm and the signal processing function parameters and transmitting the algorithm and the signal processing function parameters to the digital signal processor.

7. The amplifier of claim 6, wherein the controller comprises a programmable microprocessor for receiving at least one of the algorithm and the signal processing function parameters to be transmitted to the digital signal processor.

In *Phillips*, the Federal Circuit explained that “[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term. * * * Because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims. * * * Differences among claims can also be a useful guide in understanding the meaning of particular claim terms. * * * For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.” 415 F.3d at 1314-15.

Although the Federal Circuit has also explained that “[w]hile we recognize that the doctrine of claim differentiation is not a hard and fast rule of construction, it does create a presumption that each claim in a patent has a different scope. “There is presumed to be a difference in meaning and scope when different words or phrases are used in separate claims. To the extent that the absence of such difference in meaning and scope would make a claim superfluous, the doctrine of claim differentiation states the presumption that the difference between claims is significant.” *Comark Communications, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998), quoting *Tandon Corp. v. United States Int’l Trade Comm’n*, 831 F.2d 1017, 1023 (Fed.Cir.1987).

QSC urges that claim differentiation does not apply here because claim 7 calls for a “programmable microprocessor,” and the specification discloses both programmable and non-programmable microprocessors. Also, QSC urges that its proposed construction calls for a “microprocessor” – not necessarily a “programmable” microprocessor.

Claim differentiation is a “guideline,” not a hard and fast rule, and although the doctrine of claim differentiation is at its strongest when a limitation sought to be “read into” a parent claim already appears in a dependent claim, *see InterDigital Communications, LLC v. Int’l Trade Comm’n*, 690 F.3d 1318, 1324 (Fed. Cir. 2012), here the relationship of claims 6 and 7, especially when considered in the context of the specification noting that a “microprocessor” is simply a preferred form of “controller,” leaves no doubt that “controller” should not be limited to a “microprocessor” as QSC asserts.

b) “separate and distinct”

With respect to “separate and distinct,” the answer is not so apparent.

The Federal Circuit has advised that “[w]e have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’ * * * We have made clear, moreover, that the ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application,” *Phillips*, 415 F.3d at 1312-13, and “[t]he inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation. * * * That starting point is based on the well-settled understanding that inventors are typically persons skilled in the field of the invention and that patents are addressed to and intended to be read by others of skill in the pertinent art.” *Id.* at 1313.

Here, Mr. Pirkle, Crest’s expert, has offered a discussion of “controller” through the prism of one of ordinary skill in the art. Accordingly, that discussion is set out in full (footnotes omitted):

52. To a person of ordinary skill in this art, the term “controller” means “an electronic device that exercises some level of control in a system, such as, for example, a microprocessor.” As understood by one of ordinary skill in the art, a microprocessor is a device that “performs the functions of a central processing unit” which accesses input/output (I/O) devices, interfaces and peripherals (other devices connected to it) and memory. A Digital Signal Processor (DSP) is called a “microprocessor” as evidenced by manufacturer’s own device manuals e.g. “the ADSP-2100 family is a collection of programmable single chip microprocessors” and “Blackfin Processors are a new breed of 16-32-bit embedded microprocessor” and “The DSP56K family... features a modular chip layout with a standard central processing module” where “ADSP-2100” and “Blackfin” and “DSP56K” are well known DSP chip families. These all have data channels for communicating with I/O devices, interfaces, peripherals and memory. Thus, to one of ordinary skill in the art, the term “controller” means “microprocessor,” and a digital signal processor is an example of a microprocessor.

53. Figure 2 of the '542 patent shows a functional block diagram which means that the different blocks (labeled "AMP, DSP, DAC, uC" etc...) depict functionality and not physical embodiments. For example, one of the earliest family of Digital Signal Processors was the Motorola DSP56000 (a.k.a. the "56K"). The 56K "core" was a specific kind of arithmetic computer designed especially for DSP algorithms (in fact, it would be poorly suited to run a personal computer which requires different kinds of algorithms). However, the core alone was not offered as a DSP chip. The 56K family consisted of a multitude of products including the 56002, 56004, 56007, 56009, 56156, 56167, 56301, 56303, 56602, 56603, 569002 and others. The reason for having so many different parts (and numbers) was related not only to the type of Digital Signal Processing but more importantly to the peripheral *controllers* that were embedded into the device. For example, the 56002 had the 56K core plus multiple input/output port controllers. The 56009 included even more input/output port controllers in addition to the 56K core. At the time of the '542 patent, Digital Signal Processors available on the market already incorporated multiple functional blocks such as port and other controllers built into the same physical device. An excellent example from around the same time period as the '542 patent is the Motorola 56301 which had a PCI *controller* built in - prior to that, the PCI controller (used to communicate with a computer's PCI bus) was a separate chip or integrated circuit. I worked on a consulting project for MIDIMan Inc, called the Delta 10/10 which was a PCI computer card for audio use. The product was designed around the Motorola 56301 specifically because it includes a PCI controller built into the DSP chip. Notwithstanding the fact that the microcontroller shown as block 290 in Figure 2 of the '542 patent is a functional block and not necessarily a physically separate embodiment, one of ordinary skill in the art at that time would have understood that *controller* functionality was being built into the DSP chips and was likely, and desirably, already part of many of the DSP offerings available at the time. One way that manufacturers differentiated their products in the marketplace was based on the additional port controllers and other peripheral controllers that were added to the DSP core.

54. In my review of the file histories and patent-in-suit I did not find any usage inconsistent with this meaning.

56. Defendants' proposed construction for the term as "a microprocessor, separate and distinct from the digital signal processor" does not agree with digital signal processor manufacturers' specifications which clearly refer to digital signal processors as having controllers that are not distinct and separate from the DSP device. To a person of ordinary skill in this art, a digital signal processor is a microprocessor designed for specific tasks. Included in these tasks are the interaction with I/O devices, interfaces, peripherals and memory. It was well known in the art at the time that DSP devices included controllers. As a designer, a prime factor in selecting a particular DSP for an application was the kind of built-in peripheral controllers the device offered. This includes controllers for "receiving and storing" algorithms and other controller functionality.

57. In fact, the Defendant's term "separate and distinct" is vague in this case. Clearly, the Motorola 56301 had functional blocks that were separate and distinct (a DSP core

and separate a PCI controller along with other separate components), yet they were built into one physical package and were contained on a single “die” (a term describing the actual piece of silicon that has the circuitry embedded in it). In another example, there are integrated circuits which may have two separate die packaged inside of one physical chip - without prior knowledge of this one could not say for sure that the single chip had multiple smaller chips inside it. Likewise, a single printed circuit board (PCB) might have two separate chips on it, yet it is still a single PCB.

Ex. J [Dkt. 1911-11] at ¶¶ 52-57.

Thus, at the time of the time of the invention, there were apparently available electronic devices that performed the function of a “digital signal processor” or DSP, and a least some of those devices included embedded or integral “controllers” that performed functions in addition to or complimentary to the DSP.

QSC says that “there is nothing in QSC’s construction that precludes the controller and DSP from being on the same chip or the controller sharing resources with the DSP.” QSC’s Resp. Brief [Dkt. 192] at 44. Rather, QSC says, “[t]he touchstone for whether the devices are separate and distinct is whether the controller is capable of transmitting algorithms and parameters to the DSP as required by claim 6—devices that can transmit to each other are separate and distinct; those that can’t, aren’t.” *Id.*

The specification explains that “[a] controller, preferably in the form of a microprocessor, is provided in the digital signal processor for processing the control signals for modifying signal processing programs and coefficients to modify the functions and function parameters defined by the program.” ’542 patent, col. 3, lines 13-17 (emphasis added). Thus, the “controller,” according to that description, is “in the digital signal processor.” In light of Mr. Pirkle’s explanation, that would apparently suggest to one of ordinary skill in the art that the inventor was describing a “preferred” embodiment in which the “controller” was embedded or integral with the DSP.

However, it also appears from Mr. Pirkle’s declaration that the DSP and “controller” had different functions that could be represented in “functional block diagrams” that illustrated those different functions, but not necessarily that the DSP and “controller” were physically separate devices.

Similarly, the specification assigns different functions to the “digital signal processor” and the “controller.”

The specification at the outset explains that “[a] preferred embodiment of the present invention provides an amplifier having a digital signal processor for selectively programming signal processing functions and signal processing function parameters.” ’542 patent, col. 2, lines 25-28 (emphasis added). Namely, the function of the DSP is “for selectively programming signal processing functions and signal processing function parameters.” Mr. Pirkle explains that “one of the earliest family of Digital Signal Processors was the Motorola DSP56000 (a.k.a. the ‘56K’). The 56K ‘core’ was a specific kind of arithmetic computer designed especially for DSP algorithms (in fact, it would be poorly suited to run a personal computer which requires different kinds of algorithms).” [Dkt. 191-11] at ¶ 53.

The specification then describes various “preferred” features of the “digital signal processor.” ’542 patent, col. 2, line 28-col. 3, line 12.

The specification next describes the “controller”:

A controller, preferably in the form of a microprocessor, is provided in the digital signal processor for processing the control signals for modifying signal processing programs and coefficients to modify the functions and function parameters defined by the program. The control signals are input from the network bus and portable programmer to the digital signal processor. The control signals define the programs and coefficients for setting the signal processing functions and parameters in the digital signal processor. The controller may also be programmed to compute parameters for the digital signal processor based on command signals input from the network or the portable programmer.

’542 patent, col. 3, lines 12-24. Namely, the “controller” has the function of “for processing the control signals for modifying signal processing programs and coefficients to modify the functions and function parameters defined by the program,” in which those “control signals” are said to “define the programs and coefficients for setting the signal processing functions and parameters in the digital signal processor.” Additionally, the “controller” “may also be programmed” to perform the function of “comput[ing] parameters for the digital signal processor based on command signals input from the network or the portable programmer.”

In the detailed description, the ’542 patent explains that:

Digital signal processor 250 is programmable and performs a signal processing operation for amplifying or modifying the characteristics of an input audio signal to produce a modified output signal.

’542 patent, col. 6, lines 1-4. In particular, the specification explains that:

The digital signal processor 250 is capable of receiving and storing an algorithm or program that defines a signal processing function and/or corresponding function parameters. In addition, the digital signal processor 250 is adapted to receive control signals for modifying the signal processing function and associated parameters.

'542 patent, col. 6, lines 5-10. The specification then explains the advantages of a programmable DSP:

Because the digital signal processor 250 is a programmable device, an increased flexibility in signal processing is possible. More specifically, several different signal processing functions can be combined and modified by simply inputting appropriate control signals to the digital signal processor 250. This allows the amplifier to implement such advantageous features as distributed system performance including array steering and acoustic zone control, as well as, using adaptive algorithms and linear-phase, all-zero filters and amplifier power dissipation controls.

'542 patent, col. 6, lines 10-19.

The specification further explains that “[t]ypically, the control signals input to the digital signal processor 250 comprise information for modifying the signal processing function defined by the program stored in the digital signal processor 250. Then additional control signals for defining the parameters of the newly defined signal processing functions are input to the digital signal processor 250.” ’542 patent, col. 6, lines 28-34.

The specification then says that “[t]he operation of the amplifier 100 having the digital signal processor 250 is described in the following paragraphs.” ’542 patent, col. 6, lines 35-37. That description continues through col. 7, line 32.

In reference to Fig. 2:

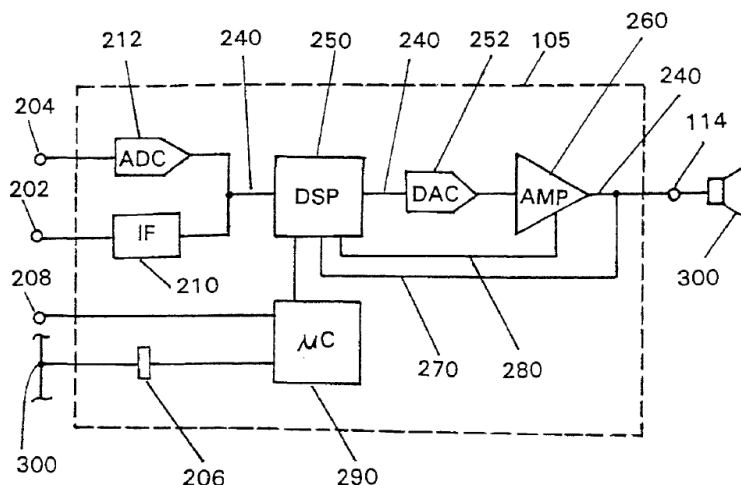


FIG. 2

the specification explains that:

Input audio or input control signals are received in the amplifier 100 via one or more of the analog input port 204, the digital input port 202, the signal programmer port 208 and the network bus 300 and input port 206. The signals received from the analog signal input port 204 and the digital signal input port 202 are audio signals. The signals received from the analog signal input port 204 are converted to digital signals by the converter 212. The signals received from the digital signal input port 202 are transmitted to the digital signal processor 250 via the signal interface 210.

'542 patent, col. 6, lines 38-47. Thus, as illustrated, signals from analog input port 204 are converted to digital signals in analog-to-digital converter 212, and input to DSP 250. Signals from digital signal input port 202 are sent to a "signal interface 210" and then to DSP 250.

With respect to signal programmer port 208 and the network bus 300 and input port 206, the specification next explains that:

The signals received from the network bus 300 and the signal programming port 208 are control signals. The control signals include audio signal processing programs and program data for defining the signal processing function and parameters of the amplifier 100.

'542 patent, col. 6, lines 47-52. Thus, "control signals" include (1) "audio signal processing programs," and (2) "program data for defining the signal processing function and parameters of the amplifier 100."

As illustrated, those “control signals” are input to “microprocessor 290,” which is what the specification says: “The control signals received from the network bus 300 and the signal programming port 208 are input to the microprocessor 290.” ’542 patent, col. 6, lines 53-55.

The specification then explains what “microprocessor 290” does with those “control signals,” namely: “The microprocessor 260 [*sic.* 290] then downloads the control signals to the digital signal processor 290 by digital data transfer in either the serial or parallel form.” ’542 patent, col. 6, lines 55-57. That, of course, suggests that “microprocessor 290” may simply perform a “pass-through” function.

However, the specification further explains that “[t]he microprocessor 250 [*sic.* 290] may transfer programs in a form executable by the digital signal processor 250 or may transfer coefficients and data to be used by the program stored in the digital signal processor 250 in executing the signal processing function or functions.” ’542 patent, col. 6, lines 58-62.

Namely, the specification explains that “[t]he microprocessor 290 [1] may have its own program for computing data and coefficients based on information passed to it over the network bus 300 or programmer port 208 or [2] it may simply pass on data that is readily usable by the digital signal processor 250.” ’542 patent, col. 6, lines 62-67 (brackets added).

The specification then explains what the “control signals” received by DSP 250 from “microprocessor 290” do. Namely, the specification explains that:

The control signals received in the digital signal processor 250 from the microprocessor 290 modify and/or combine at least one of a plurality of signal processing control functions and change the corresponding function parameters, as desired. This is achieved in the digital signal processor 250 by executing the newly downloaded program stored in the digital signal processor program memory or by using parameters downloaded to data memory.

’542 patent, col. 7, lines 1-8. Specifically, the “control signals” “modify and/or combine at least one of a plurality of signal processing control functions and change the corresponding function parameters, as desired.” That, per the specification, is done in DSP 250 “by executing the newly downloaded program stored in the digital signal processor program memory or by using parameters downloaded to data memory.”

“Thus” or the result, says the specification:

Thus, when digital audio signals are input to the digital signal processor 250, the audio signals are modified in accordance with the signal processing functions and parameters set by the control signals input to the digital signal processor 250 from the microprocessor 290. The digital audio signals are then output from the digital signal processor 250 and are converted to analog signals by the converter 252 and then sent to the power amplifier 260 and then to the loudspeaker 300.

'542 patent, col. 7, lines 9-17. Namely, the digital “audio signals” from path 240 “are modified in accordance with the signal processing functions and parameters set by the control signals input to the digital signal processor 250 from the microprocessor 290.” The “digital audio signals” are then “output from the digital signal processor 250 and are converted to analog signals by the converter 252 and then sent to the power amplifier 260 and then to the loudspeaker 300.”

The DSP, as described in the specification, also performs an additional function that, as described, “microprocessor 290” does not participate in. In particular, the specification explains that:

The amplifier performance is monitored by the signal path 280 to provide an additional control over the performance of the power amplifier 260 as described above. For example, the digital signal processor 250 may switch or modulate the power supply voltages to improve amplifier efficiency and sonic quality.

The signal path 270 monitors and detects the voltage and current of the signal output from the amplifier 260 and inputs the detected voltage and current values to the digital signal processor 250 which calculates the load impedance and power supplied to the load 300. The digital signal processor 250 can automatically control signal processing functions and parameters in response to the calculated load impedance and power supply.

'542 patent, col. 7, lines 18-32.

In the end, the patentee chose to claim “the invention” as:

1. An amplifier comprising:

a power amplifier; and

a digital signal processor capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters,

the digital signal processor being connected to the power amplifier and having a first input for receiving at least one of the algorithm and signal processing function parameters and an input/output port for receiving performance characteristics of the

power amplifier and for transmitting control signals for modifying the performance of the power amplifier.

6. The amplifier of claim 1, further comprising a controller for receiving the algorithm and the signal processing function parameters and transmitting the algorithm and the signal processing function parameters to the digital signal processor.

7. The amplifier of claim 6, wherein the controller comprises a programmable microprocessor for receiving at least one of the algorithm and the signal processing function parameters to be transmitted to the digital signal processor.

Parent claim 1 uses the open-ended transition phrase “comprising” which means that the claim includes the following listed limitations, but is not limited to those listed limitations. Thus, parent claim 1 does not “require” a “controller,” but does not preclude the same.

As discussed above, claim 1 first calls for “a digital signal processor” and further defines the same as being “capable of receiving and storing at least one of an algorithm which defines at least one signal processing function and signal processing function parameters.”

Claim 1 secondly requires that “the digital signal processor being connected to the power amplifier,” or, more colloquially, that the “digital signal process” is “connected to the power amplifier.”

Claim 1 then requires that the “digital signal processor” have “a first input” and that input is functionally defined as “for receiving at least one of the algorithm and signal processing function parameters.”

Claim 1 then structurally requires “an input/output port,” functionally defined as “[1] for receiving performance characteristics of the power amplifier and [2] for transmitting control signals for modifying the performance of the power amplifier.”

Thus, claim 1 requires (1) a “power amplifier” and (2) a “digital signal processor” as claimed. Claim 1, accordingly, again permits (through the open-ended “comprising” transition phrase) a “controller” or other structure or limitations, but does not require the same.

Claim 6 adds the requirement for a “controller.” Thus, while the “digital signal processor” in claim 1 may or may not require a “controller,” claim 6 plainly requires the same.

Claim 6 calls for that “controller” as capable of performing two functions, namely (1) “for receiving the algorithm and the signal processing function parameters,” and (2) “transmitting the algorithm and the signal processing function parameters to the digital signal processor.”

As discussed above, according to the specification, those “functions” are not performed by the “digital signal processor” *per se*, although the “digital signal processor” may or may not include a “controller” for performing those functions.

To the extent that QSC’s proposed construction of “separate and distinct” requires “discrete components” for the “digital signal processor” and the “controller,” that is rejected. The specification plainly contemplates that “[a] controller, preferably in the form of a microprocessor, is provided in the digital signal processor for processing the control signals for modifying signal processing programs and coefficients to modify the functions and function parameters defined by the program.” ’542 patent, col. 3, lines 13-17 (emphasis added). Additionally, QSC’s proposed construction, as understood, does not require that the “digital signal processor” and the “controller” constitute discrete components.

Insofar as understood based on the current record, and given the present claims, a generic “digital signal processor” (the specification of the ’542 patent does not specify any particular “digital signal processor”) may or may not include a “controller.” Crest has provided examples of DSPs that include “controllers,” but it is not clear whether all “digital signal processors,” particularly in the relevant time frame of the preparation and prosecution of the ’542 patent, necessarily include a “controller.” Again, claim 1 calls for a “digital signal processor,” but does not expressly call for a “controller.”

Once again, the specification explains that:

The signals received from the network bus 300 and the signal programming port 208 are control signals. The control signals include audio signal processing programs and program data for defining the signal processing function and parameters of the amplifier 100.

’542 patent, col. 6, lines 47-52. Fig. 2 illustrates that those “control signals” are input to “microprocessor 290,” which is what the specification says: “The control signals received from the network bus 300 and the signal programming port 208 are input to the microprocessor 290.” ’542 patent, col. 6, lines 53-55.

The specification then explains “microprocessor 260 [*sic.* 290] then downloads the control signals to the digital signal processor 290 [*sic.* 250] by digital data transfer in either the serial or parallel form.” ’542 patent, col. 6, lines 55-57. That, of course, suggests that “microprocessor 290” may simply perform a “pass-through” function. However, as noted above, the specification also explains that “[t]he microprocessor 250 [*sic.* 290] may transfer programs in a form executable by the digital signal processor 250 or may transfer coefficients and data to be used by the program stored in the digital signal processor 250 in executing the signal processing function or functions.” ’542 patent, col. 6, lines 58-62. And, in particular, the specification explains that “[t]he microprocessor 290 [1] may have its own program for computing data and coefficients based on information passed to it over the network bus 300 or programmer port 208 or [2] it may simply pass on data that is readily usable by the digital signal processor 250.” ’542 patent, col. 6, lines 62-67 (brackets added).

Returning to claim 6:

6. The amplifier of claim 1, further comprising a controller for receiving the algorithm and the signal processing function parameters and transmitting the algorithm and the signal processing function parameters to the digital signal processor.

the claim language says that the “amplifier” of claim 1 further comprises “a controller for receiving the algorithm and the signal processing function parameters.” That seems to clearly refer to “an algorithm which defines at least one signal processing function and signal processing function parameters” as recited in claim 1.

That suggests that claim 6 is drawn to the embodiment in which:

The signals received from the network bus 300 and the signal programming port 208 are control signals. The control signals include audio signal processing programs and program data for defining the signal processing function and parameters of the amplifier 100.

’542 patent, col. 6, lines 47-52, and “microprocessor 260 [*sic.* 290] then downloads the control signals to the digital signal processor 290 [*sic.* 250] by digital data transfer in either the serial or parallel form.” ’542 patent, col. 6, lines 55-57. Namely, a “pass-through” function – although, again, “comprising” is open-ended which does not preclude the controller (or microprocessor) from performing other functions as well.

Claim 7:

7. The amplifier of claim 6, wherein the controller comprises a programmable microprocessor for receiving at least one of the algorithm and the signal processing function parameters to be transmitted to the digital signal processor.

then adds that the “controller” comprises “a programmable microprocessor,” and, as noted above, the specification discloses that “microprocessor 290 may have its own program for computing data and coefficients based on information passed to it over the network bus 300 or programmer port 208 * * *.” ’542 patent, col. 6, lines 62-67.

In the end, Crest’s proposed construction does not fully explain the “controller” as defined by claims 6 and 7. On the other hand, QSC’s proposed “separate and distinct” does not accurately describe an “amplifier” comprising “a power amplifier” and a “digital signal processor” (claim 1) that, per claim 6, further comprises a “controller.” The “digital signal processor” and “controller” may have “separate and distinct” functions, but the “controller” *per se* is not necessarily “separate and distinct from the digital signal processor” as QSC’s proposed construction would require.

Again, courts are not at liberty to “rewrite” the claims. Claim construction rather for explaining what claims mean when the parties dispute the same.

Here, it would seem most accurate to explain that claim 1 is drawn to an “amplifier” “comprising” a “power amplifier” and a “digital signal processor” having the functions described in that claim, and as further described in other constructions for terms and phrases used in claim 1. Claim 1 does not require that the “amplifier” contain a “controller,” but because of the open-ended transition phrase “comprising” may or may not contain a “controller” or other components. Claim 6 adds that the “amplifier” of claim 1 has a “controller” which is an electronic device that exercises some level of control in a system, such as, for example, a microprocessor. The “controller” performs functions in addition to those performed by the “digital signal processor” which, according to claim 6 are (1) “for receiving the algorithm and the signal processing function parameters” and (2) “transmitting the algorithm and the signal processing function parameters to the digital signal processor.” The “controller” can be, but is not required to be, a separate physical device from the “digital signal processor.” The “controller” may be a functional component of the “digital signal processor,” but performs functions in addition to those performed by the “digital signal processor.”

5. Recommendation

For the foregoing reasons, the master recommends that the Court construe “controller” as follows:

Claim 1 is drawn to an “amplifier” “comprising” a “power amplifier” and a “digital signal processor” having the functions described in that claim, and as further described in other constructions for terms and phrases used in claim 1.

Claim 1 does not require that the “amplifier” contain a “controller,” but because of the open-ended transition phrase “comprising” may or may not contain a “controller” or other components.

Claim 6 adds that the “amplifier” of claim 1 has a “controller” which is an electronic device that exercises some level of control in a system, such as, for example, a microprocessor.

The “controller” performs functions in addition to those performed by the “digital signal processor” which, according to claim 6 are (1) “for receiving the algorithm and the signal processing function parameters” and (2) “transmitting the algorithm and the signal processing function parameters to the digital signal processor.”

The “controller” can be, but is not required to be, a separate physical device from the “digital signal processor.” The “controller” may be a functional component of the “digital signal processor,” but performs functions in addition to those performed by the “digital signal processor.”

Claim 7 adds that the “controller” comprises a programmable microprocessor.

H. “external programmer”

The parties’ proposed the following contested constructions:

Claim Nos.	Crest’s Proposed Construction	QSC’s Proposed Construction
’544, cl. 1	No construction necessary. Otherwise: “a hardware device for programming an amplifier”	“a hardware device, external to an amplifier’s housing, for programming the amplifier.”
AJCCS [Dkt. 184] at 11, Crest’s Op. Brief [Dkt. 191] at 39, QSC’s Resp. Brief [Dkt. 192] at 46		

1. Disputed Phrase in Context

Claim 1 of the '544 patent provides, with the disputed phrase emphasized:

1. An amplifier comprising:

an input port for receiving an input signal;

a signal processing circuit comprising a digital signal processor capable of receiving at least one of a signal processing function and a signal processing function parameter, wherein the signal processing circuit receives the input signal from the input port and modifies the input signal;

a power amplifier for amplifying the modified input signal received from the signal processing circuit and outputting an amplified signal to an output device;

an external programmer; and

a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

2. The Parties' Arguments

a) Crest's Opening Brief

Crest urges that the disputed phrase does not require construction, but, if construction is required, the disputed phrase should be construed according to its ordinary meaning, *i.e.*, "a hardware device for programming an amplifier." Crest's Op. Brief [Dkt. 191] at 39.

Crest first points to claim 9, providing:

9. The amplifier of claim 1, wherein the external programmer comprises:

an input/output port for sending and receiving control information;

a data input device for allowing input of programming information to the programmer;
and

a controller for receiving the input programming information, generating programming signals from the input programming information and transmitting the programming signals through the input/output port to the amplifier for modifying at least one of a signal processing function and a signal processing function parameter of the amplifier.

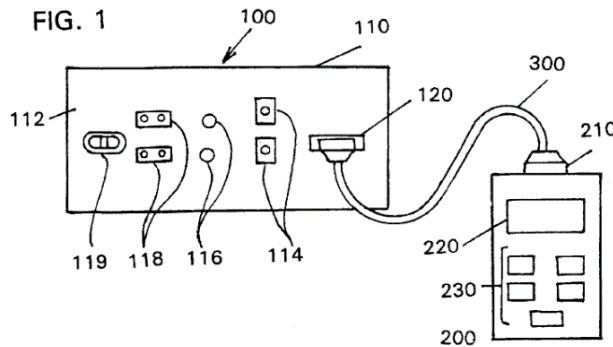
Crest urges that "[a] person of ordinary skill in the art would understand the term 'external programmer' to mean a hardware device for programming an amplifier. The fact that the programmer is a hardware device is confirmed by claim 9, which recites that the external programmer comprises

“an input/output port,” “a data input device,” and “a controller.” Because an input/output port, a data input device, and a controller are all are physical hardware components, this underscores that the programmer is a hardware device for programming an amplifier.” Crest’s Op. Brief [Dkt. 191] at 39.

With respect to QSC’s proposed construction of “external to an amplifier’s housing,” Crest urges that the claim does not require a housing, and “defining the meaning of ‘external’ in physical relation to a limitation that is not required by the claim is clearly improper.” *Id.*

Crest urges that “[a]dditionally, Defendant’s extraneous ‘housing’ requirement is improper because it injects confusion into the meaning of the term. For example, when an amplifier includes interconnected components distributed in multiple housings, as described as embodiments in the ‘542 patent (which is incorporated by reference into the ‘544 patent), Defendant’s construction is not clear as to when an external programmer would be considered ‘external to an amplifier’s housing.’ Thus, Defendant’s proposed construction should be rejected for the additional reason that it creates confusion and ambiguity in the meaning of the term.” *Id.*

Crest also urges that its proposed construction is supported by the specification. Referring to Fig. 1 of the ‘544 patent:



Crest notes that figure depicts programmer 200 as a hardware device. Crest further notes that the specification explains that “[t]he portable amplifier programmer according to the preferred embodiment includes a microprocessor, a keypad, a display screen, and a connecting member for connecting the portable programmer to an amplifier to download signal processing parameters.” Crest’s Op. Brief [Dkt. 191] at 40, quoting ‘544 patent col. 3, lines 32-36. Thus, Crest says, “the specification of the ‘544 patent supports Crest Audio’s construction that the term ‘external programmer’ means ‘a programmer that is external to an amplifier.’” *Id.*

b) QSC's Responsive Brief

QSC urges that “[t]he parties’ dispute on this term comes down to Crest’s attempt to read ‘external’ out of the term ‘external programmer.’ QSC’s construction—which preserves the key concept of ‘external’—is mandated by the intrinsic evidence.” QSC’s Resp. Brief [Dkt. 192] at 46.

QSC contends that “an external programmer” means that “the programmer must be external to something. The question is: to what?” *Id.* at 47. QSC urges that “[t]he specification provides a clear answer: the programmer is external to the amplifier’s housing and is removably connectable to the amplifier.” *Id.*

Starting with the abstract, QSC says, “the ’544 patent’s specification expressly and repeatedly describes ‘a portable programmer that is removably connectable to the amplifier,” and that programmer “includes a microprocessor, a keypad, and a display screen.” *Id.* Also pointing the abstract, QSC points to “[w]hen the portable programmer *is connected to the amplifier*, information relating to parameter[s] of various signal processing elements can be read and modified through the programmer,” and when “the programmer is removed” from the amplifier, “[t]he signal processing circuit elements remain programmed.” *Id.* at 47. QSC urges that “[t]here can be little doubt that the specification is describing a programmer that is external to the amplifier housing—just as is shown in every Figure in the patent.” *Id.*

QSC also points to the “summary of the invention” portion of the ’544 patent explaining that “amplifier programmer capable of being removably connected to the amplifier to quickly and easily change signal processing functions and/or parameters of the amplifier without providing a conventional controller in the amplifier and without modifying signal processing circuit elements.” *Id.* quoting ’544 patent, col. 2, lines 48-54. QSC says that “[t]he inventor believed this provided advantages over conventional amplifiers because it obviated the ‘need to open the amplifier housing and remove a signal processing circuit support to change the [signal processing] circuit parameters.’ ” *Id.*, quoting ’544 patent, col. 4, lines 52-55. QSC urges that “[a]gain, the programmer is external to the amplifier housing because the housing need not be opened to use it.” *Id.* at 48.

QSC also points to other portions of the specification:

Further, the specification describes that “amplifier 100” “includ[es] an amplifier housing 110.” The specification further describes a “portable amplifier programmer 200”—shown as external to the “amplifier’s housing 110.” The specification also describes that the external programmer is “removably connectable to the amplifier through a

connector 300 which is connected to the programming port 120 of the amplifier....” Port 120 is shown on the outside of the amplifier housing. Likewise, Figure 2 shows an amplifier 100 with an amplifier housing 110, where “portable programmer 200” is external to the housing and inputs programming information to the amplifier “through the connector 300.” Moreover, the specification describes that “[a]s soon as the command signals have been input from the programmer 200 through the connector 300 to the programming port 120, the programmer 200 can be disconnected from the amplifier 100” And the specification later describes that “[t]he connector 300 is inserted into the programming port 120 of the amplifier 100 to connect the portable programmer 200 to the amplifier 100.”

QSC’s Resp. Brief [Dkt. 192] at 48-49.

QSC urges that “[s]o, common sense, plain English, and every disclosure concerning the programmer in the specification shows a programmer that is external to the amplifier’s housing. Indeed, there is not one sentence in the whole of the specification that describes how an external programmer can be anything other than external to the amplifier’s housing.” *Id.* at 49.

Addressing Crest’s proposed construction, QSC says that Crest contends that an “external programmer” can be an “internal programmer”: “That is, Crest claims that so long as the ‘external programmer’ is external to the ‘amplifier,’ it can be an ‘external programmer.’ Thus, a programmer that is inside of the amplifier housing but not part of the amplifier itself, is an ‘external programmer’ within Crest’s meaning.” *Id.*

QSC urges that “[o]f course, there is not one word of support in the specification for this tortured interpretation. Instead, Crest’s only argument seems to be a claim differentiation argument that itself makes little sense. Crest insists that claim 6 somehow requires the possibility that the external programmer could be an internal programmer because claim 6 describes the amplifier housing. But claim 6 has numerous limitations other than the inclusion of ‘an amplifier housing,’ and, as a matter of law, does not give rise to claim differentiation. Crest’s attempt to write-out critical claim language should be rejected.” *Id.*, citing *Black & Decker*, 260 Fed. Appx. at 289-90 (no claim differentiation where there are additional limitations in dependent claim and/or where intrinsic evidence overrides doctrine) (parenthetical by QSC).

c) Crest’s Reply

Crest replies that “[t]he words of claim 1 unambiguously answer QSC’s question,” external “to what?” Crest replies that “[s]pecifically, claim 1 recites that ‘the external programmer [is] removably connectable to the programming signal input port *for modifying at least one of a signal processing*

function and a signal processing function parameter defined in said signal processing circuit.’ ” Crest’s Reply [Dkt. 193] at 20-21.

Crest urges that “[a]ccordingly, when the term is read in the context of the remainder of the claim, it is clear that the external programmer is external to the thing it programs – the signal processing circuit. Stated another way, the external programmer is not integrated with the signal processing circuit, but is external to it by virtue of it being removably connectable.” *Id.* at 21.

Crest further urges that “[i]n order to make its argument, QSC again resorts to arguing that limitations from the specification should be imported into the claim. * * * Not only is QSC’s argument legally baseless, *Phillips*, 415 F.3d at 1320, but statements QSC cites from the specification do not even support its proposition that the programmer must be external to a housing. At most, the cited statements describe a portable programmer being connected to an amplifier. * * * There is simply nothing that requires the programmer to be external to an amplifier housing.” *Id.*

d) Parties’ Presentation Slides

Crest presented the following presentation slides at the claim construction hearing illustrating its arguments:

Crest’s Presentation Slides

Claim phrase: “external programmer”

Crest Audio’s Proposed Interpretation	QSC’s Proposed Interpretation
No construction necessary.	“a hardware device, external to an amplifier’s housing, for programming the amplifier”
Otherwise: “a hardware device for programming an amplifier”	

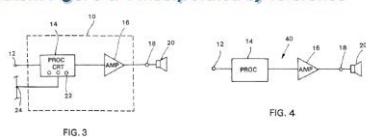
No Basis or Need for Adding “Housing”

Crest Audio’s Proposed Interpretation	QSC’s Proposed Interpretation
No construction necessary.	“a hardware device, external to an amplifier’s housing , for programming the amplifier”
Otherwise: “a hardware device for programming an amplifier”	

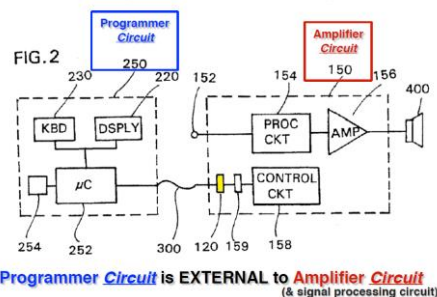
No Basis or Need for Adding “Housing”

- Fig. 1 depicts external to amplifier housing
- Fig. 2 does not
- QSC’s construction ignores interconnected amplifiers

- ‘542 patent Figs. 3 & 4 incorporated by reference



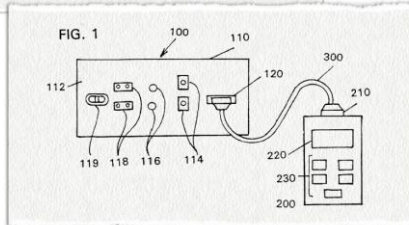
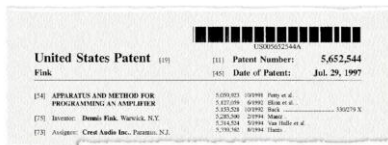
Focus Not on Housing, but on Amplifier & Programmer Circuitry



Programmer Circuit is EXTERNAL to Amplifier Circuit
(= signal processing circuit)

QSC presented the following slides at the claim construction hearing illustrating its argument:

QSC's Presentation Slides



BACKGROUND OF THE INVENTION

A. Field of the Invention

The present invention relates to an apparatus and method for programming a signal processing circuit of an amplifier, and more particularly, to an amplifier and a portable amplifier programmer capable of being removably connected to the amplifier to read and/or change various parameters of an amplifier signal processing circuit to thereby modify a signal output from the amplifier.

'544 patent at 1:7-16

The embodiments of the present invention provide several advantages. Because the programmer can be quickly and easily connected via a data port in the amplifier, there is no need to open the amplifier housing and remove a signal processing circuit support to change the circuit parameters.

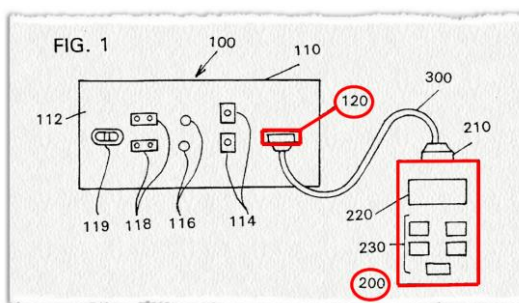
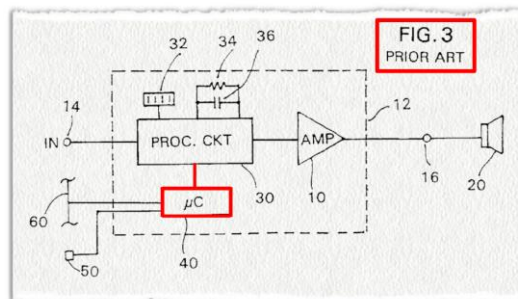
'544 patent at 4:51-60

B. Claim Phrase: "external programmer" (claim 1)

Crest Audio's Proposed Interpretation	QSC's Proposed Interpretation
No construction necessary.	"a hardware device, external to an amplifier's housing, for programming the amplifier"
Otherwise: "a hardware device for programming an amplifier"	

Extrinsic evidence also shows that "programming signal input port" is used in the claims in its ordinary meaning, which is "a data interface for programming communication." For example, the MICROSOFT COMPUTER DICTIONARY, 5th Ed., (2002) defines "port" as "[a]n interface through which data is transferred between a computer and other devices" Ex. K at 83. Similarly, the DSP56000 DIGITAL SIGNAL PROCESSOR FAMILY MANUAL (1992), which is a manual for a family of digital signal processors, refers to a collection of pins on a digital signal processor chip as the "Port A Interface." *Id.* at 86-91 (section 8.2 titled "PORT A INTERFACE"). The ADSP-2100 FAMILY USER'S MANUAL, 3d Ed., (1995), which is a manual

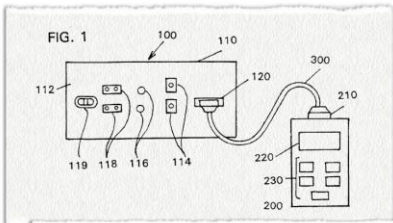
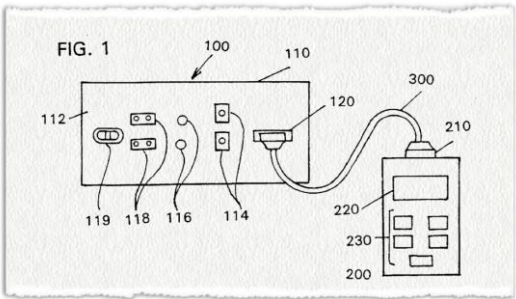
Dkt. 191 at 38.



B. Claim Phrase: "external programmer" (claim 1)

Crest Audio's Proposed Interpretation	QSC's Proposed Interpretation
No construction necessary.	"a hardware device, external to an amplifier's housing, for programming the amplifier"
Otherwise: "a hardware device for programming an amplifier"	

QSC's Presentation Slides



'544 patent at
4:51-60

The embodiments of the present invention provide several advantages. Because the programmer can be quickly and easily connected via a data port in the amplifier, there is no need to open the amplifier housing and remove a signal processing circuit support to change the circuit parameters.

QSC's Presentation Slides

Citation	Description
Abstract	"An apparatus and method for programming an amplifier includes an amplifier and a <i>portable programmer</i> that is removably connectable to the amplifier."
Abstract	"The portable programmer includes a microprocessor, a keypad, and a display screen."
Abstract	"When the portable programmer is connected to the amplifier ..."
1:10-17	"The present invention relates ... more particularly, to an amplifier and a <i>portable amplifier programmer</i> capable of being removably connected to the amplifier ..."

Citation	Description
2:48-54	"A preferred embodiment of the present invention provides an amplifier and amplifier programmer capable of being removably connected to the amplifier to quickly and easily change signal processing functions and/or parameters of the amplifier without providing a conventional controller in the amplifier and without modifying signal processing circuit elements."
2:54-58	"The preferred embodiment of the present invention includes a <i>portable amplifier programmer</i> that is capable of receiving input information and transmitting the input information to an amplifier circuit to modify signal processing functions and/or parameters."

Citation	Description
2:59-62	"Another feature of the preferred embodiment relates to an amplifier having a data port for being connected to the <i>portable amplifier programmer</i> and receiving control signals from the programmer."
2:62-66	"The amplifier also includes a control circuit connected between the data port and a signal processing circuit for performing an interface function between the command signals input from the <i>portable programmer</i> and the signal processing circuit."
3:33-37	"The <i>portable amplifier programmer</i> according to the preferred embodiment includes a microprocessor, a keypad, and a display screen and a connecting member for connecting the <i>portable amplifier programmer</i> to an amplifier ..."

Citation	Description
4:1-5	"If a digital signal processor is provided in the amplifier, programs and program data for defining a plurality of signal processing functions and function parameters may be entered into the <i>portable programmer</i> and downloaded from the <i>portable programmer</i> to the amplifier."
4:6-11	"The signal processing circuit may preferably have a memory or storage means for storing the information input from the <i>portable amplifier programmer</i> so that the <i>portable amplifier programmer</i> can be disconnected from the amplifier ..."
4:14-18	"A <i>portable programmer</i> user can select a reading mode wherein the programmer sends an inquiry signal to the signal processing circuit and outputs to the programmer a set value for each of the signal processing circuit elements."

QSC's Presentation Slides

Citation	Description
4:21-25	"The microprocessor in the portable programmer is capable of receiving the previously set parameters of the circuit elements ..."
4:30-34	"Because the portable amplifier programmer can read a parameter for each of the circuit elements, the programmer can prompt a portable programmer user to accept or change a parameter for each of the plurality of signal processing circuit elements."
4:35-38	"The portable amplifier programmer may preferably include a memory or suitable storage device for storing a plurality of preset signal processing parameters and desired parameter values input through the keypad."

Citation	Description
5:17-21	"In addition, the amplifier circuitry can be programmed by either the portable programmer or a standard computer which is connected to a network of amplifiers which allows for maximum flexibility."
5:33-35	"FIG. 1 is a schematic view showing a preferred embodiment of a portable amplifier programmer and amplifier of the present invention;"
5:64 – 6:2	"A preferred embodiment of a portable amplifier programmer 200 is also shown in FIG. 1. The programmer 200 is removably connectable to the amplifier 100 through a connector 300 which is connected to the programming port 120 of the amplifier 100 and an output port 210 of the portable programmer 200."

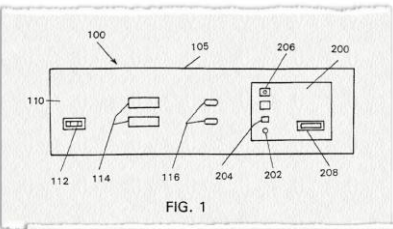
Citation	Description
7:7-9	"A memory or storage device 254 may be provided in the portable programming circuit."
7:29-61	"The connector 300 is inserted into the programming port 120 of the amplifier to connect the portable programmer 200 to the amplifier 100."

Citation	Description
4:47-50	"Thus, the user of the portable amplifier programmer only has to select a single group from a menu and the programmer will input that stored group to the control circuit of the amplifier."
4:52-55	"Because the programmer can be quickly and easily connected via a data port in the amplifier, there is no need to open the amplifier housing and remove a signal processing circuit to change the circuit parameters."
5:8-11	"Because the parameter of the signal processing circuit elements cannot be changed without using the portable amplifier programmer, no unauthorized modification of the signal processing circuit elements is possible."

Citation	Description
6:9-14	"The portable programmer 200 allows a user to modify parameters of amplifier circuit elements inside the amplifier, ..."
6:41-43	"Programming information is input from the portable programmer 200 through connector 300 and programming port 120 to the control circuit 158."
6:55-59	"If such a digital signal processor is provided in the amplifier 100, both signal processing functions and function parameters can be changed by inputting control information from the portable programmer 200 to the amplifier 100."

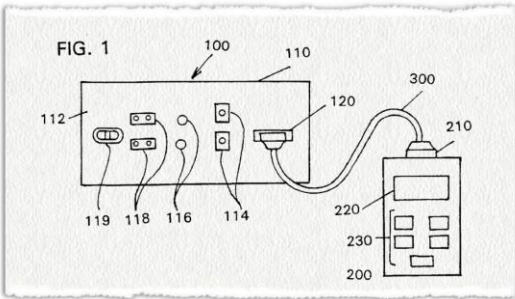
The digital signal processing module also preferably includes a programming port for being removably connected to a portable amplifier programmer described in U.S. patent application Ser. No. 08/558,344 which is a continuation application of U.S. patent application Ser. No. 08337,157, entitled "APPARATUS AND METHOD FOR PROGRAMMING AN AMPLIFIER," filed on Nov. 9, 1994 in the name of the same Applicant as in the present application, the disclosure of which is hereby incorporated by reference.

'542 patent at 2:60 – 3:1

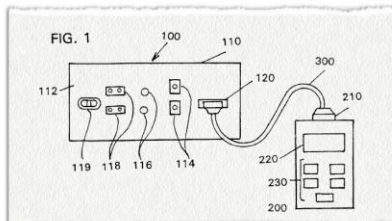


'542 patent at 4:55-59

Also, a portable programmer input port 208 is provided on the module 200 for being removably connected to and receiving digital control signals from a portable programmer described in U.S. patent application Ser. No. 08/558,344 referred to above.



QSC's Presentation Slides



'544 patent at 4:51-60

The embodiments of the present invention provide several advantages. Because the programmer can be quickly and easily connected via a data port in the amplifier, there is no need to open the amplifier housing and remove a signal processing circuit support to change the circuit parameters.

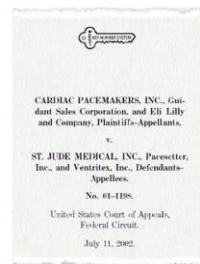
Further, because the programmer contains a microprocessor, this eliminates the need for a microprocessor in the amplifier. Accordingly, the complexity and noise produced by an analog/digital converter required with the microprocessor located within the amplifier is eliminated.

'544 patent at 4:64 - 5:1

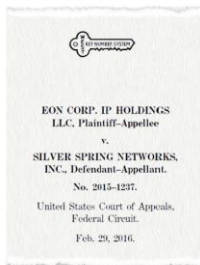
B. Claim Phrase: "external programmer" (claim 1)

Cardiac Pacemakers, Inc. proposed interpretation: "a hardware device, external to an amplifier's housing, for programming the amplifier"	QSC's Proposed Interpretation: "a hardware device, external to an amplifier's housing, for programming the amplifier"
Other proposed interpretation: "a hardware device, external to an amplifier's housing, for programming the amplifier"	

Consistent with
Intrinsic Evidence

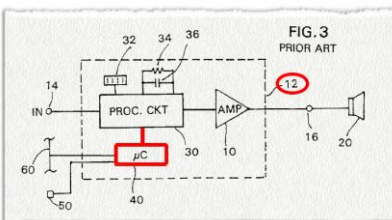


Consequently, the claim at issue requires a monitoring means that activates. An alternative construction would render the first "monitoring" term meaningless. That construction is therefore improper; this court will not rewrite claims.



[12, 13] A party is, therefore, "not entitled to a claim construction divorced from the context of the written description and prosecution history." *Nystrom v. TREX Co., Inc.*, 424 F.3d 1136, 1144-45 (Fed.Cir. 2005). Ordinary meaning is not something that is determined "in a vacuum." *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed.Cir.2005).

Accordingly, when the term is read in the context of the remainder of the claim, it is clear that the external programmer is external to the thing it programs – the signal processing circuit. Stated another way, the external programmer is not integrated with the signal processing circuit, but is external to it by virtue of it being removably connectable. It is therefore unnecessary to construe this term in order to provide context for the word "external."



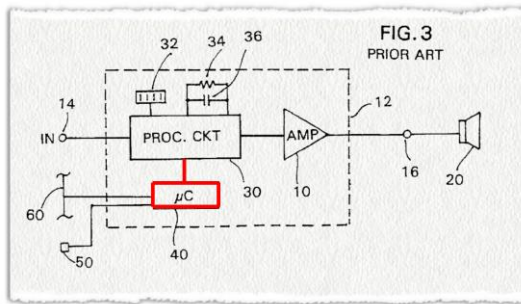
'544 patent at 2:23-25

The conventional amplifier 10 may include a controller 40 for receiving input command signals for modifying the signal processing parameters.

Further, because the programmer contains a microprocessor, this eliminates the need for a microprocessor in the amplifier. Accordingly, the complexity and noise produced by an analog/digital converter required with the microprocessor located within the amplifier is eliminated.

'544 patent at 4:64 - 5:1

QSC's Presentation Slides



6. The amplifier of claim 1, further comprising an amplifier housing, the signal processing circuit and power amplifier being located in said amplifier housing.

260 Fed.Appx. 284
This case was not selected for publication in West's Federal Reporter. See Fed. Rule of Appellate Procedure 22.1 generally governing citation of judicial decisions issued on or after Jan. 1, 2007. See also U.S.Ct. of App. Fed. Cir. Rule 32.1. United States Court of Appeals, Federal Circuit.
BLACK & DECKER, INC. and Black & Decker (U.S.), Inc., Plaintiffs-Cross Appellants, v. ROBERT BOSCH TOOL CORPORATION, Defendant-Appellant.
Nos. 2007-1243, 2007-1244.
Jan. 7, 2008.

The district court based its construction of "power conversion circuit" in large part on the principle of claim differentiation, because dependent claims require a power conversion circuit ("PCC") that produces a voltage different from the power supply or battery. *Black & Decker v. Robert Bosch Tool Corp.*, 389 F.Supp.2d 1010, 1022 (N.D.Ill.2005). That doctrine, however, cannot serve as a basis to give a patent scope beyond the invention it discloses. See *Kraft Foods, Inc. v. Int'l Trading Co.*, 203 F.3d 1362, 1368 (Fed.Cir.2000). Any presumption arising here from the dependent claims fails to override the proper construction of "power conversion circuit" provided by the claims, the specification, and the prosecution history. Accordingly, as discussed below, the district court erred by construing "power conversion circuit" without sufficient consideration of factors beyond those three words and the dependent claims.

RETRACTABLE TECHNOLOGIES, INC. and Thomas J. Shaw, Plaintiffs-Appellees, v. RECTOR, DICKINSON AND COMPANY, Defendant-Appellant.
No. 2010-1402.
United States Court of Appeals, Federal Circuit.
July 8, 2011.
Rehearing En Banc Denied Oct. 31, 2011.*

[3] It is axiomatic that the claim construction process entails more than viewing the claim language in isolation. Claim language must always be read in view of the written description, *Phillips*, 415 F.3d at 1315, and any presumption created by the doctrine of claim differentiation "will be overcome by a contrary construction dictated by the written description or prosecution history." *Seachange Int'l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1369 (Fed.Cir. 2005).

3. Discussion

From the parties' proposed constructions, the parties agree that "external programmer" means "a hardware device for programming an amplifier" – the core dispute is whether the phrase must be construed to include QSC's proposed construction of "external to an amplifier's housing," or whether "external" means "external to the amplifier, as Crest contends (although not expressed recited in its proposed construction.

Beginning as always with the language of the claim, claim 1 of the '544 patent, once again, calls for:

1. An amplifier comprising:

an input port for receiving an input signal;

a signal processing circuit comprising a digital signal processor capable of receiving at least one of a signal processing function and a signal processing function parameter, wherein the signal processing circuit receives the input signal from the input port and modifies the input signal;

a power amplifier for amplifying the modified input signal received from the signal processing circuit and outputting an amplified signal to an output device;

an external programmer; and

a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit. (emphasis added)

QSC is correct that “external” requires some reference point – namely “external” to what?

The claim language (before considering dependent claim 6) on one hand suggests, as Crest urges, that the “programmer” is “external” to the “amplifier. However, on the other hand, the claim calls for “an amplifier comprising” (1) “an input port,” (2) “a signal processing circuit,” (3) “a power amplifier,” (4) “an external programmer,” and (5) “a programming signal input port.” That suggests that the “amplifier” includes “an external programmer,” but plainly, according to the specification, the “external programmer” is separate from the “amplifier.” In saying that, the preamble plainly refers to an “amplifier,” as opposed to, for example, an “amplifier system.”

Or, as the abstract says “[a]n apparatus and method for programming an amplifier includes an amplifier and a portable programmer that is removably connectable to the amplifier.” ’544 patent, abstract. The abstract thus plainly refers to an “amplifier” that is a functional component separate from the “portable programmer,” and *vice versa*. Moreover, the abstract says that the “portable programmer” is “removably connected to the amplifier,” which strongly implies that the “amplifier” and “portable programmer” are not only functionally separate, but physically separate components.

Additionally, the abstract says what the “portable programmer” includes, and what the “amplifier” includes. Namely, the abstract says that “[t]he portable programmer includes a microprocessor, a keypad, and a display screen.” The abstract says that “[t]he amplifier includes a programming input port, a signal processing circuit, a power amplifier and a control circuit.”

The abstract then explains that “[w]hen the portable programmer is connected to the amplifier, information relating to parameter of various signal processing circuit elements can be read and modified through the programmer. The information input via the keypad and displayed on the display screen is transmitted from the programmer via the microprocessor to the signal processing control circuit to change signal processing functions and/or signal process function parameters of at least one

of the signal processing circuit elements. As a result, processing of a signal transmitted through the amplifier is changed so that a sound produced by the signal can be modified. The signal processing circuit elements remain programmed when the programmer is removed and/or power is disconnected.” ’544 patent, abstract.

At this point it should be explained that “external programmer” appears only in the ’544 patent claims. That phrase does not appear in the specification of the ’544 patent at all. Indeed, the term “external” only appears in the patent claims – the term appears nowhere in the specification.

Nevertheless, it is noted that the original claims submitted in the application that ultimately matured into the ’544 patent included the phrase “external programmer” in the following context:

1. An amplifier comprising:
 an input port for receiving an input signal;
 a signal processing circuit for receiving the
 input signal from the input port and modifying the input
 signal;
 a power amplifier for amplifying the input
 signal received from the signal processing circuit and
 outputting a modified signal to an output device; and
 a programming signal input device for receiving
 at least one programming signal from an external
 programmer removably connected to the programming signal
 input device for modifying at least one of a signal
 processing function and a signal processing function
 parameter defined in said signal processing circuit.

[Dkt. 191-7] at 23. That claim was subsequently amended to read:

1. (Amended) An amplifier comprising:
 an input port for receiving an input signal;
 a signal processing circuit comprising a digital signal
 processor capable of receiving at least one of a signal
 processing function and a signal processing function parameter,
 wherein the signal processing circuit receives [for receiving]
 the input signal from the input port and [modifying] modifies the

a power amplifier for amplifying the modified input signal received from the signal processing circuit and outputting [a modified] an amplified signal to an output device;
an external programmer; and
 a programming signal input [device] port for receiving at least one programming signal from [an] the external programmer, the external programmer being removably [connected] connectable to the programming signal input [device] port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

[Dkt. 191-8 at 68-69. The so amended claim became claim 1 of the '544 patent. Neither party relies on the prosecution history to support their respective constructions. That portion of the prosecution history is noted here simply to point out that although “external programmer” was not used in the specification, “external programmer” was used in the original claims. Original claims are generally considered to be part of the original disclosure. *In re Gardner*, 480 F.2d 879, 879 (CCPA 1973). *See also, Mentor Graphics Corp. v. EVE-USA, Inc.*, ____ F.3d ____ (Fed. Cir. slip op. March 16, 2017)(“Original claims are part of the original specification and in many cases will satisfy the written description requirement.”).

There appears to be no dispute that what the claims refer to as “external programmer,” the specification refers to as “portable programmer,” or sometimes “the programmer.” Namely:

- “An apparatus and method for programming an amplifier includes an amplifier and a portable programmer that is removably connectable to the amplifier.” ’544 patent, abstract.
- “The portable programmer includes a microprocessor, a keypad, and a display screen.” ’544 patent, abstract.
- “When the portable programmer is connected to the amplifier, information relating to parameter of various signal processing circuit elements can be read and modified through the programmer.” ’544 patent, abstract.
- “Another feature of the preferred embodiment relates to an amplifier having a data port for being connected to the portable amplifier programmer and receiving control signals from the programmer. The amplifier also includes a control circuit connected between the data port and a signal processing circuit for performing an interface function between the command signals input from the portable programmer and the signal processing circuit.” ’544 patent, col. 2, lines 59-66.

- “If such a digital signal processor is provided in the amplifier, both signal processing functions and function parameters can be changed by inputting control information from the portable programmer to the amplifier.” ’544 patent, col. 3, lines 17-20.
- “When the keypad is used to input a parameter value for one or more of the signal processing circuit elements, the input desired parameter values are received by the microprocessor and converted to a command signal to be downloaded to the control circuit through the portable programmer.” ’544 patent, col. 3, lines 56-61.
- “If a digital signal processor is provided in the amplifier, programs and program data for defining a plurality of signal processing functions and function parameters may be entered into the portable programmer and downloaded from the portable programmer to the amplifier.” ’544 patent, col. 4, lines 1-5.
- “The programmer is also capable of reading the previously set parameters and functions stored in the signal processing circuit. A portable programmer user can select a reading mode wherein the programmer sends an inquiry signal to the signal processing circuit and outputs to the programmer a set value for each of the signal processing circuit elements.” ’544 patent, col. 4, lines 12-17.
- “The microprocessor in the portable programmer is capable of receiving the previously set parameters of the circuit elements and transfers these parameter values to the display screen to enable a portable programmer operator to decide if a given parameter value should be changed. The keypad can be used to scroll through the parameter values for each of the circuit elements so that each of the parameters for the circuit elements is displayed on the display screen. Because the portable amplifier programmer can read a parameter for each of the circuit elements, the programmer can prompt a portable programmer user to accept or change a parameter for each of the plurality of signal processing circuit elements.” ’544 patent, col. 4, lines 22-34.
- “In addition, the amplifier circuitry can be programmed by either the portable programmer or a standard computer which is connected to a network of amplifiers which allows for maximum flexibility.” ’544 patent, col. 5, lines 18-21.

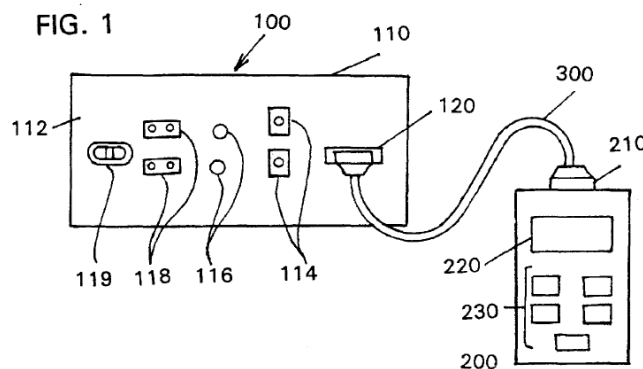
Those are just a few of the instances. If all of the instances were listed, the list would go on for another page or two. The foregoing is believed sufficient to make the point.

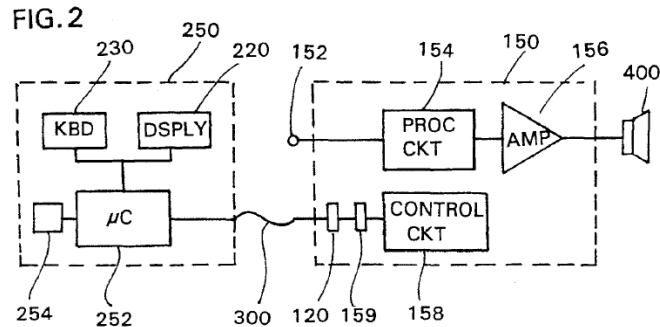
In addition, sometimes the specification uses the phrase “portable amplifier programmer.” But, the specification equates “portable amplifier programmer” to “portable programmer” or “the programmer”:

- “A preferred embodiment of a portable amplifier programmer 200 is also shown in FIG. 1. The programmer 200 is removably connectable to the amplifier 100 through a connector 300 which is connected to the programming port 120 of the amplifier 100 and an output port 210 of the portable programmer 200. The programmer 200 preferably includes a display screen 220 for displaying parameter values, desired signal modifications and other suitable information. The portable programmer 200 also includes an input device such as keypad 230 for entering parameter and signal modification information, signal processing function programs and program data.” ’544 patent, col. 5, line 64-col. 6, line 9.
- “The portable programmer 200 allows a user to modify parameters of amplifier circuit elements inside the amplifier, modify signal processing functions set by the signal processing circuit, read back previously set parameter values and store a group of input parameter values for future use as will be explained in greater detail below.” ’544 patent, col. 6, lines 9-14.
- “FIG. 2 shows an amplifier circuit 150 of the amplifier 100 shown in FIG. 1 and an operational circuit 250 of the portable programmer 200.” ’544 patent, col. 6, lines 15-17.

And so forth. In a nutshell, it does not appear that there can be any reasonable dispute that what the claims refer to as an “external programmer,” the specification refers to as a “portable programmer” or a “portable amplifier programmer” or “the programmer,” and in all instances is referring to the device shown in the drawings by reference numeral 200.

In the drawings:





and throughout the specification, the “external programmer” a/k/a “portable programmer” or “portable amplifier programmer” or “the programmer,” is consistently described in terms of being both functionally and physically separate from the “amplifier,” which, as noted above, is described as “[t]he amplifier includes a programming input port, a signal processing circuit, a power amplifier and a control circuit.” ’544 patent, abstract, and passim.

So, returning to claim 1

1. An amplifier comprising:

an input port for receiving an input signal;

a signal processing circuit comprising a digital signal processor capable of receiving at least one of a signal processing function and a signal processing function parameter, wherein the signal processing circuit receives the input signal from the input port and modifies the input signal;

a power amplifier for amplifying the modified input signal received from the signal processing circuit and outputting an amplified signal to an output device;

an external programmer; and

a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.
(emphasis added)

and QSC’s question “external” to what? it seems clear that, as described, the “external programmer” is “external” to the “amplifier” described in the specification as including a “programming input port, a signal processing circuit, a power amplifier and a control circuit.” Moreover, the specification leaves no doubt that the “external programmer” a/k/a “portable programmer” or “portable amplifier programmer” or “the programmer,” is both functionally and physically separate from the “amplifier,”

namely the “programming input port, a signal processing circuit, a power amplifier and a control circuit.”

With respect to QSC’s requirement that the “external programmer” be “external to an amplifier’s housing,” the term “housing” appears in the ’544 patent 16 times. In the claims, the term only appears in claim 6 (twice). In the specification, the term “housing” only appears in the following contexts:

“A conventional amplifier 10 is shown in FIG. 3. The amplifier is mounted within an amplifier housing 12 and includes an input port 14 and an output port 16. A load such as a loudspeaker 20 is connected to the output port 16 so that the amplifier 10 drives the loudspeaker 20. A signal processing circuit 30 of the amplifier 10 is located within the amplifier housing 12.” ’544 patent, col. 1, lines 49-55.

“However, the amplifier housing 12 must be opened and a signal processing circuit support (not shown) must be removed from the amplifier housing 12 before any of the switches 32, resistors 34 or capacitors 36 can be modified or replaced. After modifying the circuit elements, the signal processing circuit support must be re-inserted into the amplifier housing 12 and the amplifier housing 12 must be closed.” ’544 patent, col. 1, line 65-col. 2, line 5.

“The opening and closing of the amplifier housing 12 and removal of the signal processing circuit support is time consuming and does not allow a user to immediately sound check the results of the modification of the signal processing parameters. Instead, the signal processing circuit support must be reinserted in the amplifier housing 12 to be plugged back into the signal path before the amplifier 10 can be operated. In addition, the modification, removal and/or replacement of the various circuit elements to modify the parameters is a time consuming and difficult process because the signal processing control circuit elements are typically plug-in or solderable components. Also, because anyone is capable of opening the amplifier housing 12 and modifying the signal processing circuit 30, there is no way to prevent an unauthorized modification of the amplifier signal processing parameters.” ’544 patent, col. 2, lines 6-21.

“The control circuit may be preferably located outside of the signal path but connected to the signal processing circuit within the amplifier housing. The control circuit isolates the incoming command signals from the signal processing circuit elements to allow the parameters of the signal processing circuit elements to be modified as desired.” ’544 patent, col. 3, lines 3-8.

“The amplifier includes an amplifier housing 110 which includes a control panel 112 having a plurality of control elements and ports.” ’544 patent, col. 5, lines 44-48.

“The signal processing circuit 154 and power amplifier 156 are preferably located within the amplifier housing 110. The amplifier housing 110 also has a control circuit 158 located therein.” ’544 patent, col. 6, lines 27-29.

With respect to the first three instances, the specification refers to the prior art:

“A conventional amplifier 10 is shown in FIG. 3. The amplifier is mounted within an amplifier housing 12 and includes an input port 14 and an output port 16. A load such as a loudspeaker 20 is connected to the output port 16 so that the amplifier 10 drives the loudspeaker 20. A signal processing circuit 30 of the amplifier 10 is located within the amplifier housing 12.” ’544 patent, col. 1, lines 49-55.

“However, the amplifier housing 12 must be opened and a signal processing circuit support (not shown) must be removed from the amplifier housing 12 before any of the switches 32, resistors 34 or capacitors 36 can be modified or replaced. After modifying the circuit elements, the signal processing circuit support must be re-inserted into the amplifier housing 12 and the amplifier housing 12 must be closed.” ’544 patent, col. 1, line 65-col. 2, line 5.

“The opening and closing of the amplifier housing 12 and removal of the signal processing circuit support is time consuming and does not allow a user to immediately sound check the results of the modification of the signal processing parameters. Instead, the signal processing circuit support must be reinserted in the amplifier housing 12 to be plugged back into the signal path before the amplifier 10 can be operated. In addition, the modification, removal and/or replacement of the various circuit elements to modify the parameters is a time consuming and difficult process because the signal processing control circuit elements are typically plug-in or solderable components. Also, because anyone is capable of opening the amplifier housing 12 and modifying the signal processing circuit 30, there is no way to prevent an unauthorized modification of the amplifier signal processing parameters.” ’544 patent, col. 2, lines 6-21.

and speaks in terms of “amplifier housing 12 must be opened and a signal processing circuit support (not shown) must be removed from the amplifier housing 12 before any of the switches 32, resistors 34 or capacitors 36 can be modified or replaced,” and “opening and closing of the amplifier housing 12 and removal of the signal processing circuit support is time consuming and does not allow a user to immediately sound check the results of the modification of the signal processing parameters.”

In connection with the presently described invention, those portions of the specification refer to:

“The control circuit may be preferably located outside of the signal path but connected to the signal processing circuit within the amplifier housing. The control circuit isolates the incoming command signals from the signal processing circuit elements to allow the parameters of the signal processing circuit elements to be modified as desired.” ’544 patent, col. 3, lines 3-8.

“The amplifier includes an amplifier housing 110 which includes a control panel 112 having a plurality of control elements and ports.” ’544 patent, col. 5, lines 44-48.

“The signal processing circuit 154 and power amplifier 156 are preferably located within the amplifier housing 110. The amplifier housing 110 also has a control circuit 158 located therein.” ’544 patent, col. 6, lines 27-29.

Although the specification, in connection with the preferred embodiment, refers to an “amplifier housing,” and, in practical terms, it might be supposed that “amplifiers” such as described and claimed have a “housing” in an actual device offered to the public, the procedure mandated under the *Markman* decisions for “construing” claims, which “construction” may become the lynchpin in deciding infringement, *vel non*, and consequently potentially significant damages, is more exacting than that.

Clearly, the “amplifier” may, per the specification, include “an amplifier housing 110.” And, perhaps in practice, “amplifiers” such as those described in the specification typically include a “housing.”

But, in terms of the “claim construction” mandated by the *Markman* decisions and *Phillips*, plainly claim 1 of the ’544 patent does not expressly include a “housing” limitation. Nor has QSC shown that claim 1 of the ’544 patent “inherently” includes a “housing” limitation.

Nevertheless, as discussed above, it seems clear that when “external programmer” is construed properly, as it must be “in light of” the specification, and not improperly “limited by the specification,” even before considering dependent claim 6, the “external programmer” must be construed as “external” to the “amplifier,” both functionally and physically, where the “amplifier” is defined as comprising (1) “an input port,” (2) “a signal processing circuit,” (3) “a power amplifier,” and (4) “a programming signal input port” per claim 1 of the ’544 patent, as well as the specification.

When dependent claim 6 adds:

6. The amplifier of claim 1, further comprising an amplifier housing, the signal processing circuit and power amplifier being located in said amplifier housing.

that, more or less, adds “icing to the cake.” Yes, as QSC argues, “claim differentiation” is not a “rigid rule” and is more or less a “guideline,” and no the circumstances here necessarily create a “presumption” requiring “extra support” by QSC. But, while it is true, as QSC argues, that dependent claim 6 adds further definition, namely “the signal processing circuit and power amplifier being located in said amplifier housing,” the claim nevertheless first adds a requirement to claim 1 of “an amplifier housing.” The parties may argue over whether the doctrine of “claim differentiation” formally applies, but the fact remains that claim 1 of the ’544 patent does not expressly or inherently require a

“housing,” and such limitation is first entered in dependent claim 6. Those are the “facts.” One may argue over the implications, but those are the facts.

The foregoing simply does not support QSC’s proposed construction of “external programmer” as being restricted to “external to an amplifier’s housing.” However, the foregoing does support construing “external programmer” as being both functionally and physically, “external” to the “amplifier” where the “amplifier” is defined as comprising (1) “an input port,” (2) “a signal processing circuit,” (3) “a power amplifier,” and (4) “a programming signal input port.”

Yes, refusing to require that the “external programmer” be “external to an amplifier’s housing,” per QSC’s proposed construction, may not reflect all advantages disclosed in the specification, but plainly, the “claimed invention” is not limited to achieving all of the “advantages” disclosed in the specification. A contrary decision would mean that patent claims must be— “construed” – and more precisely “limited to – the “advantages” of the invention listed in the specification. That has never been the law – and QSC has cited no case so holding. Yes, the Federal Circuit has sometimes limited claims to an embodiment disclosed in the specification, but QSC has not shown that the Court should do so here.

4. Recommendation

For the foregoing reasons, the master recommends that the Court conclude that “external programmer” should be construed as being both functionally and physically, “external” to the “amplifier” where the “amplifier” is defined as comprising (1) “an input port,” (2) “a signal processing circuit,” (3) “a power amplifier,” and (4) “a programming signal input port.” The “external programmer” is not necessarily “external to an amplifier’s housing.”

I. “programming signal input port”

The parties’ proposed the following contested constructions:

Claim Nos.	Crest’s Proposed Claim Construction	QSC’s Proposed Claim Construction
’544 patent, cl. 1	No construction necessary. Otherwise: “a data interface for programming communication”	“A data port on the outside of the amplifier housing for connecting to an external programmer and receiving control signals from the programmer” modified in its brief to “A data port on the outside of the amplifier housing for connecting to an external programmer and receiving programming signals from the programmer”
A/JCCS [Dkt. 184] at 10, Crest’s Op. Brief [Dkt. 191] at 34, QSC’s Resp. Brief [Dkt. 192] at. 50		

1. Disputed Phrase in Context

Claim 1 of the ’544 patent provides, with the disputed phrase emphasized:

1. An amplifier comprising:

an input port for receiving an input signal;

a signal processing circuit comprising a digital signal processor capable of receiving at least one of a signal processing function and a signal processing function parameter, wherein the signal processing circuit receives the input signal from the input port and modifies the input signal;

a power amplifier for amplifying the modified input signal received from the signal processing circuit and outputting an amplified signal to an output device;

an external programmer; and

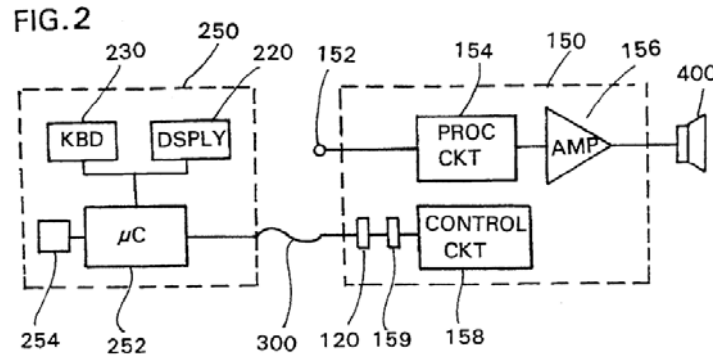
a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

2. The Parties' Arguments

a) Crest's Opening Brief

Crest contends that the disputed phrase does not require construction, but if construction is necessary, the phrase should be given its “ordinary and customary meaning.” Crest urges that the phrase may be broken into “programming signal” and “input port.” Crests says that one of ordinary skill in the art would understand that an “input port” is “a data interface for an input signal” – here that input signal is a “programming signal.” Crest urges that a person of ordinary skill in the art would understand that a “programming signal” is “programming communication.” Thus, according to Crest, the ordinary meaning of “programming signal input port” to one of ordinary skill in the art would be “a data interface for programming communication.” Crest's Op. Brief [Dkt. 191] at 35.

Crest contends that the specification supports that construction. Crest pointing to Fig. 2 of the '544 patent:



notes that amplifier circuit 150 includes a “programming port 120.” The specification, Crest further notes, explains that “[p]rogramming information is input from the portable programmer 200 through the connector 300 and the programming port 120 to the control circuit 158.” Crest's Op. Brief [Dkt. 191] at 36, quoting '544 patent, col. 6, lines 41-43. Thus, says Crest, “programming information” from the programmer is provided from the programmer to via the “programming port” to the amplifier. *Id.*

Crest also points to the specification explaining that “[t]he programming information may comprise signal processing function programs and program data for defining function parameters, parameter modification requests, new parameters, and other suitable control information.” *Id.*, quoting '544 patent, col. 6, lines 43-47. Crests says that “[t]hus, the specification describes

embodiments in which ‘programming information’ is communicated through the ‘programming port.’ So, the specification is consistent with the phrase ‘program signal input port’ having its ordinary meaning of ‘a data interface for programming communication.’ ” *Id.*

Crest criticizes QSC’s proposed construction as adding “a laundry list of incredibly narrow limitations that are neither required by the claim language nor supported by the specification.” *Id.*

With respect to QSC’s proposed construction requiring that the port be located “on the outside of the amplifier housing,” Crest urges that “Defendant’s limitation here is clearly incorrect because claim 1 neither recites nor requires ‘an amplifier housing.’ This is made clear by the fact that claim 6, which depends from claim 1, adds the element of ‘an amplifier housing.’ If the amplifier housing were required in claim 1, then it would not be introduced later in claim 6 as done so in the ‘544 patent.” *Id.*

With respect to QSC’s proposed construction calling for the programming signal input port be “for . . . receiving *control signals* from the programmer,” Crest urges that “is in conflict with the remainder of claim 1, which expressly requires that the programming signal input port is ‘for receiving at least one *programming signal* from the external programmer.’ *Id.* at 37.

Additionally, Crest notes that the specification describes an embodiment in which “[p]rogramming information is input from the portable programmer 200 through the connector 300 and the programming port 120 to the control circuit 158,” ’544 patent, col. 6, lines 41-43 (emphasis added), and that “[t]his programming information may comprise signal processing function programs and program data for defining function parameters, parameter modification requests, new parameters, and other suitable control information.” ’544 patent, col. 6, lines 43-47. Crest says that “[t]hus, the specification describes an embodiment where the programming information ‘may comprise’ (and is therefore not limited to) various types of information, including ‘control information.’ But Defendant’s proposed construction excludes the other types of ‘programming information’ that could be received from the programmer.” Crest’s Op. Brief [Dkt. 191] at 37.

Crest further urges that “[t]he flaws with Defendant’s ‘receiving control signals’ limitation is further exposed when considering claim 2, which recites that the amplifier further comprises ‘a control circuit for receiving the programming signal and converting the programming signal to a control signal.’ Because claim 2 adds a limitation regarding the programming signal being *converted to* a control

signal, the term ‘programming signal input port’ cannot be limited to only a port ‘for . . . receiving control signals from the programmer.’ ” *Id.*

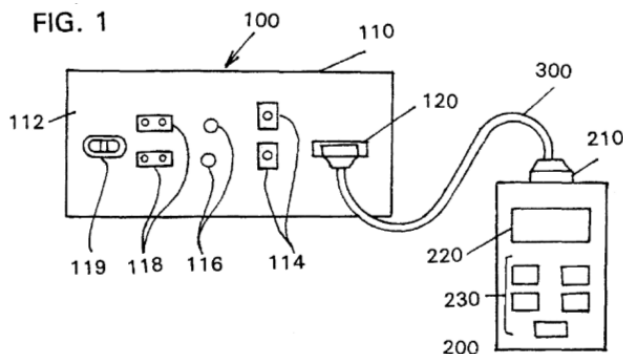
Crest also relies on various dictionary definitions. Crest points to the MICROSOFT COMPUTER DICTIONARY, 5th Ed., (2002) defining “port” as “[a]n interface though which data is transferred between a computer and other devices * * *,” a DSP56000 DIGITAL SIGNAL PROCESSOR FAMILY MANUAL (1992), a manual for a family of digital signal processors, referring to a collection of pins on a digital signal processor chip as the “Port A Interface,” a ADSP-2100 FAMILY USER’S MANUAL, 3d Ed., (1995), a manual for another family of digital signal processors, identifying several “ports” on that family of digital signal processor chips –identifying “serial ports,” a “host interface port” and “DMA ports.” Crest says that manual “describes that each of these respective ports is an interface that facilitates the transfer of information between the digital signal processor chip and another device.” *Id.* at 38. Crest urges that the extrinsic evidence supports its construction.

b) QSC’s Responsive Brief

QSC modified its earlier proposed construction by changing “control signals” to “programming signals.” QSC’s Resp. Brief [Dkt. 192] at 50. QSC says that “the central dispute here is not what type of signals the input port receives, but rather where the input port is located. Based on the intrinsic evidence, QSC proposes that the port must be on the amplifier housing, whereas Crest seeks to broaden the patent beyond the intrinsic evidence to permit the port to be anywhere.” *Id.*

QSC urges that “[t]he intrinsic evidence is clear: The port must be on the amplifier housing. The external programmer is, by definition, external to the amplifier’s housing and is removably connectable to the amplifier via the ‘programming signal input port.’ ” *Id.*

QSC points to Fig. 1 of the ’544 patent:



QSC urges that “Figure 1 shows an amplifier 100 having an amplifier housing 110. On the outside of the amplifier housing is a programming port 120.” QSC’s Resp. Brief [Dkt. 192] at 50. QSC contends that “[a] portable amplifier programmer 200 is removably connectable to the amplifier by way of a connector 300 and is inserted into the programming port 120.” *Id.* at 50-51.

QSC argues that “[t]he inventor believed this arrangement provided advantages over conventional amplifiers because it obviated the ‘need to open the amplifier housing and remove a signal processing circuit support to change the [signal processing] circuit parameters.’ And, as the inventor provided, ‘[t]he opening and closing of the amplifier housing 12 and removal of the signal processing circuit support is time consuming and does not allow a user to immediately sound check the results of the modification of the signal processing parameters.’” *Id.* at 51.

“Thus,” says QSC, “the specification clearly discloses an amplifier programmer that is external to the amplifier’s housing and connectable to the amplifier by way of a data port on the outside of the amplifier’s housing, so that a user does not need to open the amplifier’s housing—a time consuming process—to modify signal processing functions and parameters.” *Id.* at 51.

QSC says *vis-à-vis* Crest’s construction that “Crest objects to QSC’s construction on only one ground. Crest contends that claim differentiation prohibits inclusion of ‘an amplifier housing’ into the construction of ‘programming signal input por” for claim 1. But as described above with respect to the ‘external programmer’ limitation, claim 6 requires more than merely an amplifier housing, so claim differentiation does not apply here. Moreover, Crest’s construction would broaden the scope of the claim’s [*sic*] beyond the invention disclosed. This is not proper. As such, QSC’s construction should be adopted.” *Id.* at 51-52.

c) Crest’s Reply

Crest urges that “QSC has backtracked from its earlier construction and conceded that its ‘control signals’ limitation for this term was improper. *See* Dkt. 192, p. 50 (‘QSC has modified its proposal to replace “control signals” with “programming signals”). However, QSC remains steadfast in seeking to improperly import a housing limitation into the term ‘programming signal input port.’ *See id.*” Crest’s Reply [Dkt. 193] at 19.

In response to QSC’s contention that “[t]he port must be on the amplifier housing,” Crest replied that “claim 1 of the ‘544 patent neither recites nor requires an amplifier housing. Claim 6 makes this fact clear by introducing the element ‘an amplifier housing’ in a claim that depends from claim 1.

More importantly, QSC now expressly and explicitly admits that the preamble of claim 1 of the '544 patent does not require a housing limitation (unlike claim 1 of the '542 patent). So QSC's argument to locate the port on a housing has no support and must be rejected." *Id.* at 20.

Crest further urges that "QSC's only argument for requiring the housing limitation in this term is that 'the specification clearly discloses an amplifier programmer that is external to the amplifier's housing and connectable to the amplifier by way of a data port on the outside of the amplifier's housing, so that a user does not need to open the amplifier's housing' Dkt. 192, p. 51. However, QSC's position violates the fundamental claim construction principle that a limitation from the specification should generally not be imported into the claims. *Phillips*, 415 F.3d 1320. QSC offers no explanation as to why the Court should be compelled to violate this principle." *Id.* at 21.

Crest concludes that "[a]part from the requirement of a housing limitation, QSC does not dispute Crest's proposed construction. Thus, if the Court determines that construction of this term is necessary, the Court should adopt Crest's construction." *Id.*

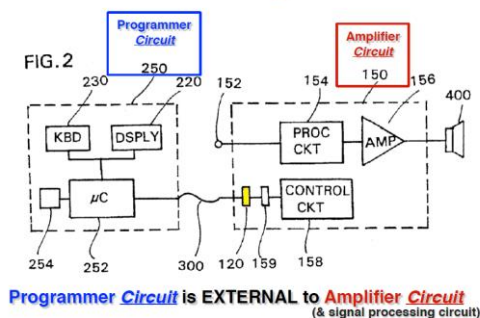
d) Parties' Presentation Slides

Crest presented the follow slides during the claim construction hearing illustrating its arguments:

Crest's Presentation Slides

Claim phrase: "programming signal input port"		No Mandate for Placement of Programming Signal Input Port ON a Housing	
Crest Audio's Proposed Interpretation	QSC's Proposed Interpretation	• Fig. 1 is just one embodiment	
No construction necessary.	"a data port on the outside of the amplifier housing for connecting to an external programmer and receiving control signals from the programmer"	• Fig. 2 is another embodiment	
Otherwise: "a data interface for programming communication"		• '542 patent's interconnected amplifier incorporated by reference	
		• No language in '544 patent specification of port ON housing	

Crest's Presentation Slides

No Mandate for Port to be ON an Amplifier's Housing

An additional Crest slide advises “Why Does This Matter? But that slide is designated “Highly Confidential – Attorneys’ Eyes Only

QSC presented the following slides during the claim construction hearing illustrating its arguments:

QSC's Presentation Slides

A. **Claim Phrase: “programming signal input port” (claim 1)**

Crest Audio's Proposed Interpretation	QSC's Proposed Interpretation
No construction necessary.	“a data port on the outside of the amplifier housing for connecting to an external programmer and receiving control signals from the programmer”
Otherwise: “a data interface for programming communication”	

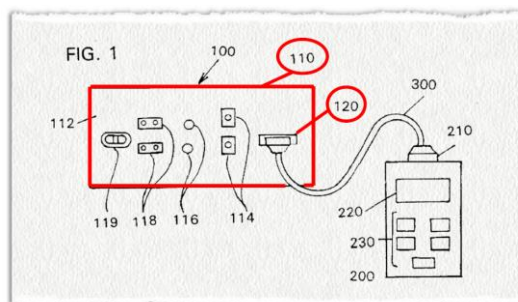
a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

'544 patent at 8:35-41

BACKGROUND OF THE INVENTION**A. Field of the Invention**

The present invention relates to an apparatus and method for programming a signal processing circuit of an amplifier, and more particularly, to an amplifier and a portable amplifier programmer capable of being removably connected to the amplifier to read and/or change various parameters of an amplifier signal processing circuit to thereby modify a signal output from the amplifier.

'544 patent at 1:7-16



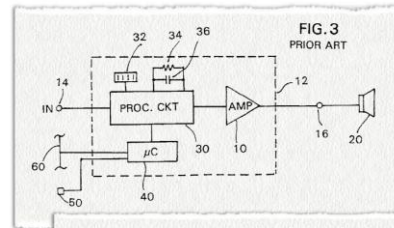
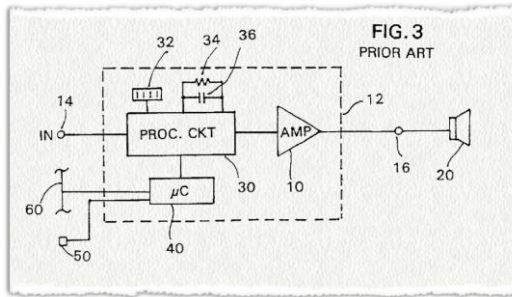
Another feature of the preferred embodiment relates to an amplifier having a data port for being connected to the portable amplifier programmer and receiving control signals from the programmer.

'544 patent at 2:59-62

The embodiments of the present invention provide several advantages. Because the programmer can be quickly and easily connected via a data port in the amplifier, there is no need to open the amplifier housing and remove a signal processing circuit support to change the circuit parameters.

'544 patent at 4:51-55

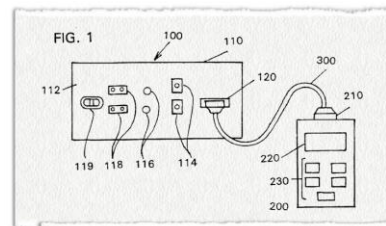
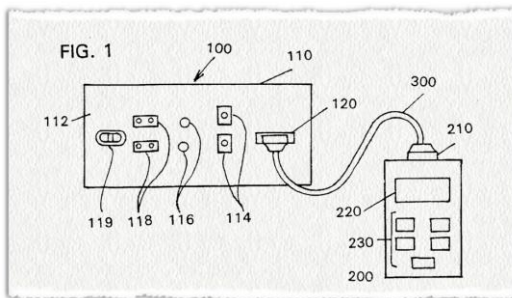
QSC's Presentation Slides



'544 patent at
1:62 - 2:2

The signal processing function and parameters of the amplifier 10 can only be modified by setting one of the switches 32 or removing and/or replacing one or more of the resistors 34 and capacitors 36. However, the amplifier housing 12 must be opened and a signal processing circuit support (not shown) must be removed from the amplifier housing 12 before any of the switches 32, resistors 34 or capacitors 36 can be modified or replaced.

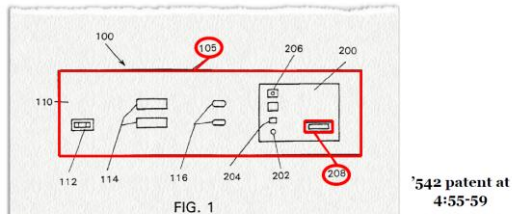
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The embodiments of the present invention provide several advantages. Because the programmer can be quickly and easily connected via a data port in the amplifier, there is no need to open the amplifier housing and remove a signal processing circuit support to change the circuit parameters.

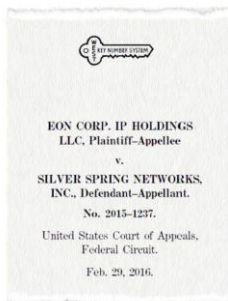
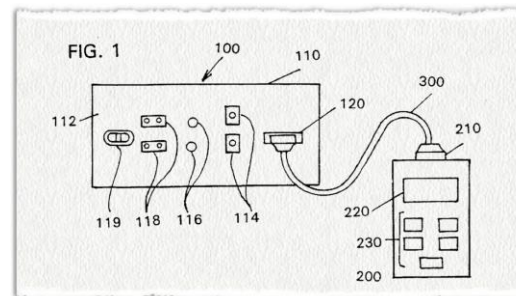
'544 patent at 4:51-55

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'542 patent at
4:55-59

Also, a portable programmer input port 208 is provided on the module 200 for being removably connected to and receiving digital control signals from a portable programmer described in U.S. patent application Ser. No. 08/558,344 referred to above.

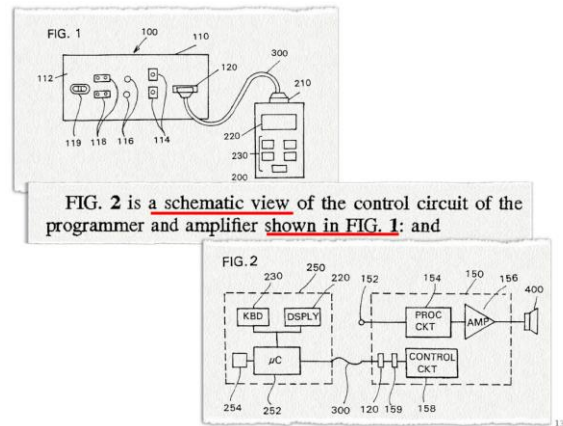


[12, 13] A party is, therefore, "not entitled to a claim construction divorced from the context of the written description and prosecution history." *Nystrom v. TREX Co., Inc.*, 424 F.3d 1136, 1144-45 (Fed.Cir. 2005). Ordinary meaning is not something that is determined "in a vacuum." *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed.Cir.2005).

A. Claim Phrase: "programming signal input port" (claim 1)	
Ch. Audio's Proposed Interpretation	QSC's Proposed Interpretation
"a data port on the outside of the amplifier housing for connecting to an external programmer and receiving control signals from the programmer"	"a data port on the outside of the amplifier housing for connecting to an external programmer and receiving control signals from the programmer"

Consistent with
Intrinsic Evidence

QSC's Presentation Slides



3. Discussion

The parties' respective constructions, "a data interface for programming communication" (Crest) and "[a] data port on the outside of the amplifier housing for connecting to an external programmer and receiving programming signals from the programmer" (QSC) differ principally in whether the "data interface" or "data port" (which difference the parties do not dispute) must be on the "outside of the amplifier housing" as QSC asserts.

In large part, QSC's argument here is based on its prior argument *vis-à-vis* "external programmer" discussed above.

QSC's argument that claim 1 of the '544 patent:

1. An amplifier comprising:

an input port for receiving an input signal;

a signal processing circuit comprising a digital signal processor capable of receiving at least one of a signal processing function and a signal processing function parameter, wherein the signal processing circuit receives the input signal from the input port and modifies the input signal;

a power amplifier for amplifying the modified input signal received from the signal processing circuit and outputting an amplified signal to an output device;

an external programmer; and

a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the

programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

must be construed such that the “programming signal input port” must be “on the outside of the amplifier housing for connecting to an external programmer and receiving programming signals from the programmer” per QSC’s proposed construction is simply not supported.

As discussed above, claim 1 of the ’544 patent does not, expressly or inherently, call for a “housing.”

As discussed above, for the foregoing reasons, the master recommends that the Court conclude that “external programmer” should be construed as being both functionally and physically, “external” to the “amplifier” where the “amplifier” is defined as comprising (1) “an input port,” (2) “a signal processing circuit,” (3) “a power amplifier,” and (4) “a programming signal input port.” The “external programmer” is not necessarily “external to an amplifier’s housing.”

In relation to the current disputed term, “programming signal input port,” in the context of

a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

plainly that is subsumed within the construction for “external programmer.” The conclusion that the “external programmer” is not necessarily “external to an amplifier’s housing” also means that that the

a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

is not necessarily “[a] data port on the outside of the amplifier housing * * *” as QSC asserts.

In conformance with the construction of “external programmer” above:

For the foregoing reasons, the master recommends that the Court conclude that “external programmer” should be construed as being both functionally and physically, “external” to the “amplifier” where the “amplifier” is defined as comprising (1) “an input port,” (2) “a signal processing circuit,” (3) “a power amplifier,” and (4) “a programming signal input port.” The “external programmer” is not necessarily “external to an amplifier’s housing.”

the “programming signal input port” is not required to be “on the outside of the amplifier housing” as QSC’s proposed construction would require.

4. Recommendation

The master recommends that the Court conclude that:

a programming signal input port for receiving at least one programming signal from the external programmer, the external programmer being removably connectable to the programming signal input port for modifying at least one of a signal processing function and a signal processing function parameter defined in said signal processing circuit.

does not require that such port be “on the outside of the amplifier housing” as QSC asserts. Given the parties’ respective constructions of “a data interface for programming communication” (Crest) and “[a] data port on the outside of the amplifier housing for connecting to an external programmer and receiving programming signals from the programmer” (QSC), rejecting QSC’s proposed construction of “outside of the amplifier housing” would appear to resolve the issue.

V. Conclusion

The foregoing constitutes the master’s report and recommendation on the disputed terms and phrases in the ’542 and ’544 patents. The parties are reminded that the Court’s Order of September 23, 2016 [Dtk. 186] provides:

The parties will have twenty-one days to file objections to any Report and Recommendation on claim construction issued by the Special Master. Failure to file objections within the time set forth above will be deemed a waiver of any objections to the Report and Recommendation, such that they are deemed approved, accepted, and ordered by the Court. If any objections are filed, the Court will review the findings of fact and conclusions of law in the Report and Recommendation under the de novo review standard, and any procedural matters under the abuse of discretion standard.

If the foregoing report and recommendation has overlooked or fails to fully resolve the parties’ dispute, or if the parties believe any portion of this report and recommendation is unclear, the parties may also request supplemental claim construction from the Court, which the Court may or may not refer that the master.

SIGNED this 31st day of March 2017, in San Antonio, Texas.

/s/ Gale R. Peterson

Gale R. Peterson, Special Master

CERTIFICATE OF SERVICE

A copy of the foregoing was electronically filed with the Court through the ECF system this 31st day of March, 2017. Notice of this filing will be sent by operation of the Court's electronic filing system. Parties may access this filing through the Court's system.

/s/ Gale R. Peterson

Gale R. Peterson, Special Master